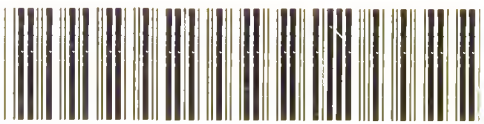
THE DIAGNOSIS OF DISEASE.

PARKINSON.



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BY

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LONDON:
BAILLIÈRE, TINDALL AND COX,
20 & 21, KING WILLIAM STREET, STRAND.
1898.

PREFACE.

THE diagnosis of disease is the department of medicine which usually offers the greatest difficulty to the student, and often to the practitioner. The plan of the following pages is to show the methods of examination generally employed, and the deductions which may be made from their employment.

Certain frequent symptoms have been taken, and their causes put into groups, which plan is useful both at examination and in practice. The symptoms of different diseases have been taken in conjunction with their physical signs, so that the two may be ranged side by side in the mind of the reader.

In order to keep the limits of the book within a small compass, many of the rare diseases have been passed over.

If the book prove of use to students preparing for examination, and to junior practitioners of medicine, the wishes of the author will have been accomplished.

The physical signs of the chest diseases are mainly taken from Dr. Walsh's classical work.

I must thank Dr. Murrell for his kind assistance and advice during the preparation of this book.

57, WIMPOLE STREET,
LONDON, W.,
November, 1897.

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THE DIAGNOSIS OF DISEASE.

CHAPTER I.

GENERAL.

The examination of a patient should commence by a survey of his GENERAL APPEARANCE.

The face may be flushed from fever, or show the venous congestion of mitral disease, or cirrhosis of the liver, or may be pale from anæmia or aortic disease. There may be jaundice, seen most markedly on the conjunctivæ, or the general bronzing of the skin seen in Addison's disease, or there may be a rash.

The patient may look older than his years, suggesting previous illness or a hard life.

The eyes may be looked at: arcus senilis, a white opaque ring round the corneal margin, may be present prematurely. This is normal in persons well past middle age, but appearing earlier shows a tendency to degeneration of tissue. The size of the pupil will be considered later.

The eyelids may be puffy and swollen, and the ocular conjunctiva œdematous, suggesting the presence of kidney disease.

The temporal artery may be very visible and tortuous, showing arterial degeneration.

Pigmented scars may be present on the forehead, telling of previous syphilis.

The gums may show a blue line at their margins, due to presence of lead in the system.

The teeth should be noted: their absence or great decay may be the cause of dyspepsia.

If the upper incisor teeth show at their cutting edge a central

notch, it raises a suspicion of inherited syphilis, especially if this be combined with a depressed bridge of the nose, and the presence of many scars at the angles of the mouth.

The examination of the tongue is given under the Digestive System.

The ears should be examined: they are often cyanotic in cases of congenital heart disease, or any cause embarrassing the flow of blood from the right side of the heart, as mitral or lung disease.

The shape of the head should be noted, especially in children; in rickets it may be square and flattened on the top, while the anterior fontanelle remains open longer than normal: this should close when the child is about two years old.

In hydrocephalus the head is often rounded, the vessels unduly prominent, and the eyeballs depressed.

In syphilis the head often has a square shape, resembling rickets, but the depressed bridge of the nose, the presence of snuffles, and a rash, will help in the distinction.

The neck may show the presence of scars, due to tuberculosis of cervical glands; or enlarged lymphatic glands may sometimes be felt under the skin.

The thyroid gland may be felt to be enlarged, as in exophthalmic goitre or ordinary goitre; or smaller than usual, as in myxœdema and sporadic cretinism.

Exophthalmic Goitre, or Grave's disease, occurs chiefly in young women, from puberty to middle life. The earliest symptom is, as a rule, palpitation of the heart, which beats more frequently than usual (often from 120 to 200 a minute), and there is undue arterial pulsation visible in the neck and elsewhere. The eyes become prominent, and on looking down the eyelid does not always instantaneously follow the eye movement, hence leaving a space between the corneal margin and the eyelid (von Gräfe's sign). The neck becomes full, due to the enlarged thyroid, which is usually pulsating. The patients are often anæmic, excitable, or even maniacal. The disease is very chronic, often lasting many years.

In some cases these three symptoms are not present at the same time, and occasionally it is said that undue frequency of the heart without other symptoms is due to this cause.

The hands should be examined for gouty deposits near the joints; the finger-ends for clubbing, seen in chronic heart or lung disease, or for the atrophy due to nervous disease. The wrist of a child may seem enlarged, due to rickety enlargement of the epiphyses.

The feet and legs may be examined for gouty deposits or œdema, scars, etc.

Posture if in Bed.—In unilateral diseases of the chest, the patient in bed generally lies on the side affected; though occasionally in the early stages of pleurisy or pneumonia he may lie on the sound side.

The patient may be half sitting in bed, propped by pillows, as is frequent in emphysema, bronchitis, asthma; or in cardiac diseases, or pericarditis, or when the diaphragm is pressed upwards from fluid in the abdomen or other causes increasing the intra-abdominal pressure.

In conditions of great weakness, as, for example, in enteric fever, the patients frequently lie on the back in bed, sinking down from their pillows.

Where there is any acute inflammation of the peritoneum, one or both knees are drawn up, so as to relax the abdominal muscles.

The head may be persistently retracted, as is common in meningitis or other diseases affecting the base of the brain. The face may be persistently turned to one side; it is seen sometimes after hemiplegia that the face is turned towards the sound side; or in cerebral irritation from any cause the face is turned to the convulsed or rigid limbs.

The hands may be clenched, with the thumbs inside, and the ankles and toes rigidly extended, as is seen in tetany in infants.

The SKIN AND SUBCUTANEOUS TISSUES should be examined.

1. **Nourishment.**—Great emaciation suggests a long-continued disease, as diabetes, Bright's diseases, phthisis, cancer, or diseases of the digestive organs.

2. **Perspiration.**—This is much increased during the crisis of certain diseases, as pneumonia, and during the falls of temperature of phthisis or pyæmia; in these cases sometimes the epidermis over the sweat glands is raised up into small vesicles, called *sudamina;* these may become inflamed, and then are named *miliaria.*

Sweating also is excessive in rheumatism, when it may be acid from lactic acid; in diseases tending to depress the circulation, as heart diseases; also in collapse. Local sweating is seen in certain neuroses.

There is a great diminution of the ordinary perspiration in many fevers, in diabetes and Bright's disease, and in myxœdema.

The sweat in cases of jaundice may contain colouring-matter, which stains linen yellow.

3. **Colour.**—This may be pale, red, cyanotic, jaundiced, or bronzed, from similar causes to those mentioned under Aspect.

4. **Rash** or **eruptions** may be present; these are noted under Fevers or Skin.

5. **Œdema** causes a swollen look to the skin, and on pressing with the finger it pits; this may be most marked in the lower extremities, as is seen in anæmia or heart diseases, or it may be universal, but most apparent in the eyelids and penis and scrotum, as is seen in Bright's disease.

This last must not be confounded with a hard, brawny swelling which does not pit on pressure and is universal, but best seen in the face, hands, and feet in the disease known as myxœdema.

The diagnostic marks of **myxœdema** are the peculiar brawny œdema above mentioned, with a dry, harsh skin; the hair thins in quantity and becomes very fine in texture; the hands and feet are swollen and shapeless-looking, the fingers having a sausage-shaped appearance. The speech and mental processes and gait become slow, and the strength fails. The thyroid gland in the neck is generally smaller than normal. The patients are usually women of middle age, though a disease of similar cause occurs in children.

6. **Scars.**—These may be of importance, as showing old bone disease; or depressed pigmented scars may suggest syphilis.

Respiration may be normal, or accelerated, or altered in rhythm.

It is accelerated—

1. In lung disease, as emphysema, asthma, bronchitis, pneumonia, etc.

2. In blood states, as anæmia, diabetes, or uræmia.

3. In paralysis of the diaphragm. This is diagnosed by the

abdomen becoming either motionless or falling in during inspiration.

4. In obstruction of the air-passages, as of the glottis or trachea in œdema of the glottis, diphtheria, or the presence of a foreign body, or spasm of the vocal cords, or pressure on the trachea or large bronchi by a tumour or aneurism.

5. In disturbances of the circulation, as in heart disease.

6. In febrile states.

7. When flatulence or other causes of distension of the abdomen press upon and embarrass the working of the diaphragm.

8. In cases of pain in the chest it may become shallow and rapid, as in pleurisy, pleurodynia, etc.

The rhythm of respiration is altered in chorea and in coma, in which it may be irregular. One peculiar form of irregularity is called 'Cheyne-Stokes' breathing. This consists in an alternation of deep breaths with an interval of apnœa, after which gradually again the respiratory movements commence and become deeper, again to diminish and cease again; this is seen in cases of cerebral disease, especially meningitis and apoplexy, but also in cases of cardiac disease or blood-poisoning, as uræmia.

The type of respiration may change; women generally use mostly the thorax, and men mostly the diaphragm. The diaphragmatic type may be much more marked in old people, owing to ossification of the costal cartilages; or to paralysis of the intercostal muscles in cases of myelitis of the dorsal part of the spinal cord, or in cases of progressive muscular atrophy, where the intercostal muscles are wasted. On the contrary, the diaphragm may be motionless in diaphragmatic pleurisy, acute peritonitis, excessive distension in the abdominal cavity, etc.

The Temperature.—This should be taken under the tongue if possible, and if this be impracticable, as in a young child, in the rectum; these both give reliable indications. Temperatures may also be taken in the axilla; this, if moist, should first be wiped dry, and the thermometer should remain at least ten minutes, when, if the arms have been kept close to the chest wall, it may give a reliable result.

The normal body temperature is 98·4° F., or 37° C.

Elevations of temperature may be classified as:

Subfebrile	99°-100° F.
Slight fever	100°-102° F.
Moderate fever	102°-103·5° F.
High fever	103·5°-105° F.
Hyperpyrexia	over 105° or 106° F.

Normally, fever is highest in the evening about 6 p.m., and lowest about 6 a.m.; sometimes the morning gives the highest reading—this is called the inverse type of temperature, and is sometimes seen in tuberculosis in children.

The following types are recognised:

1. Continued fever, when the daily remissions are not more than a degree and a half, as in acute pneumonia or in the second week of enteric fever, etc.

2. Intermittent fever, when the daily remissions are more than one and a half degrees and the lowest reading is normal or subnormal; this is seen in pyæmia, and often in phthisis.

3. Remittent fever, when the daily remissions are more than one and a half degrees, but the lowest reading is above normal, as in remittent fever, and frequently in phthisis.

The temperature may become normal by crisis or lysis. Typical examples of crisis in which the temperature falls suddenly and becomes normal within thirty-six hours are typhus fever and pneumonia.

Lysis is when the temperature takes more than thirty-six hours to reach the normal line. Examples: typhoid fever, acute rheumatism, etc.

The symptoms of fever are headache, malaise, anorexia, thirst, pains in the body and limbs, dry skin, flushed face, bright eyes, etc. The pulse rate is generally increased ten beats per minutes for each degree of rise of temperature; and the respirations are proportionately accelerated. There is an increase in the amount of urea in the urine, which is concentrated and of a higher colour than usual, and loaded with urates.

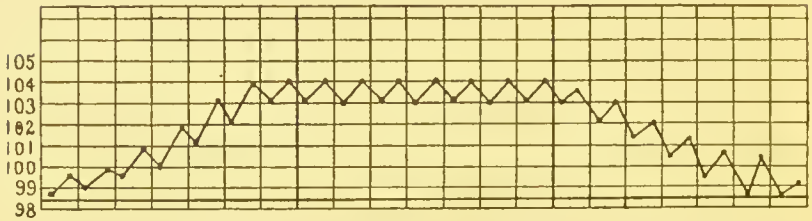
CHAPTER II.

ACUTE SPECIFIC FEVERS.

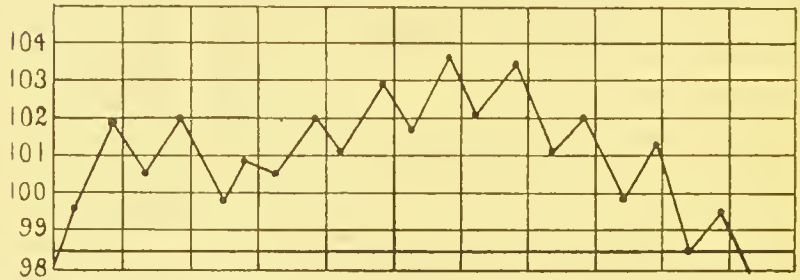
Most local inflammations are attended with more or less fever, and therefore in a febrile patient the body generally must be examined to see if a local cause be present; thus, the chest, abdomen, joints, nervous system, etc., can be excluded when it is possible that the patient may be suffering from an acute specific fever. The marked characteristics of the more common fevers are given in a tabular form below:

Fever.	*Onset.*	*Temperature.*	*Eruption.*	*Early Cardinal Symptoms.*
Typhoid ..	Insidious	Rises slowly	Seventh to fourteenth day on upper part of abdomen and back	Headache, malaise, epistaxis, diarrhœa.
Typhus ..	Acute, with chills	Rises rapidly to 102° or 103° the first day	Sixth day on sides of chest and abdomen first	Headache, febrile pains, great and early prostration.
Small-pox ..	Acute, with rigors	Rises the first day to 102° or 103°	Third day on face at first	Headache, vomiting, lumbar pain.
Varicella ..	Slight fever	To 101° or 102°	Within twenty-four hours on trunk first	Slight symptoms, early and characteristic rash, chiefly on trunk.
Scarlet fever	Acute chills, or rigor	Rises at once to 103° or 104°	Within twenty-four hours on chest first	Rigor, vomiting, sore throat, rapid pulse.
Rötheln rubeola	Slight catarrh	Subfebrile	Appears within twenty-four hours first round the mouth	Rash like measles, but comes out earlier; sore throat, with enlarged cervical glands
Measles ..	Fever, coryza	Rises to 102° the first day	Appears on fourth day at first at junction of face and hairy scalp	Coryza, rash.
Erysipelas ..	Sudden rigors	Rises at once to 104° or so	Raised red surface, with perhaps blebs, often on face or round wounds	Sudden fever, rash, enlarged glands.
Diphtheria ..	Insidious, with malaise	Rarely over 102°	None	Malaise, appearance of gray membrane on tousils or fauces, spreading to soft palate.

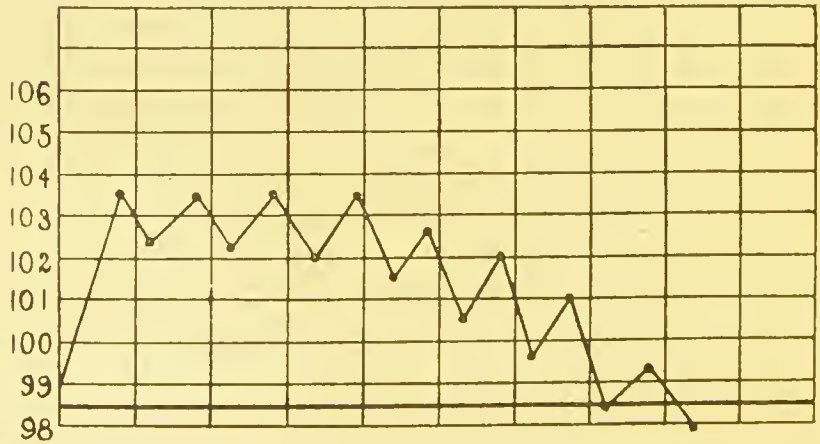
Types of Fever in the more common Acute Specifics.



TYPHOID FEVER.



MEASLES.



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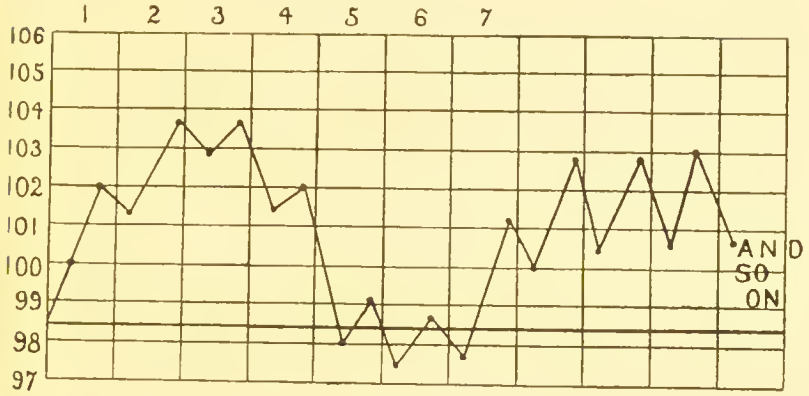
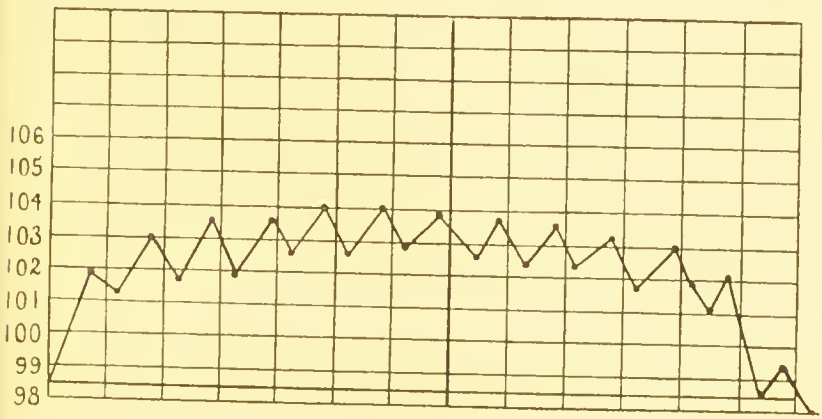


SMALL-POX.



TYPHUS FEVER.

TYPHUS FEVER

is diagnosed by its acute onset with chills or rigors, and early and great prostration; the temperature mounts at once to 103° or 104°. The bowels are constipated. The face gets dusky and the expression heavy. In a few days delirium sets in. The so-called 'mulberry rash' appears on the fifth day, at first on the wrists, or the sides of the abdomen and chest; it comes out in one crop only, and is usually confined to the trunk. At first the spots are red and raised, but they soon become darker in colour

and level with the skin; they are rather larger than the rash of enteric fever, and end in petechiæ. A day or two after the rash comes out the patient may get comatose, the delirium ceasing; he becomes very prostrate, with pupils contracted, and deafness, with much muscular tremor, till about the twelfth day the fever may suddenly end in a crisis.

The diagnosis has to be made from typhoid fever, pneumonia, or pyæmia.

SMALL-POX

sets in with a rigor or chills, the temperature mounting rapidly to 102° or 104°. There is severe headache and pain in the loins, and violent vomiting. The tongue is coated and the bowels confined. There are often also marked catarrhal symptoms.

The typical rash comes out on the third day, but it may be preceded by a universal measly rash, or a scarlatiniform eruption over the lower part of the abdomen; the characteristic rash appears first on the face and scalp, especially the forehead and upper lip; thence it spreads to the trunk and arms, but is always most marked on the face. It at first consists of papules, which are hard and feel like shot imbedded in the skin; these become red and enlarged, and on the sixth day become umbilicated vesicles—that is, the bleb has a depression in the centre; three days later the vesicle has become a pustule surrounded by a wide red areola; this in favourable cases gradually dries up, leaving a cicatrix.

When the rash appears, the temperature, which may have been raised to 104° F., sinks to normal, to rise again to a height when pustulation occurs, varying with the amount of the eruption, and the general symptoms are chiefly those of pyæmia.

This disease may be mistaken for measles at the outset, owing to the catarrhal symptoms, but the peculiar rash appearing on the third day of the illness should prevent this mistake.

SCARLET FEVER.

The onset is sudden, with chills or rigor, vomiting and sore throat. The pulse becomes exceptionally rapid, and is often 140 or 160 in a child, while the temperature is not over 103° or 104° F. The tongue is at first coated with thick white fur, through which in a day or two appear as red specks the enlarged

papillæ, the so-called 'strawberry tongue.' The tonsils and fauces are usually swollen and red at the outset, or become so in a few hours.

The rash appears within twenty-four hours, at first on the upper part of the chest, the flexor surfaces of the arms and the groins; thence it spreads over the trunk and limbs, and sometimes the face. It consists of a scarlet blush, in which can be seen minute red papules, which generally fade on pressure; after a few days the rash fades, and later on desquamation begins and lasts several weeks; with the desquamation albumin frequently appears in the urine.

The diagnosis has to be made from the other acute specifics, but especially from tonsillitis; the condition of the throat may not help, but the throat is generally more painful in an attack of tonsillitis, which would cause a temperature of 103° or over. Again, tonsillitis does not usually cause vomiting, and the pulse is only raised proportionately to the fever, whereas in scarlet fever it is generally abnormally frequent. The rash on the trunk produced by new flannel may simulate closely the rash of scarlet fever, but the extent of that is limited by the garment. The attack may be so latent as not to be noticed by the relations of the patient when the diagnosis is often made in the case of a child brought to a hospital for dropsy and albuminuria, by observing the traces of desquamation; these are generally most apparent between the fingers and toes, and in the palms and soles, or at the back of the ankles, as flakes of epidermis, which can easily be peeled off by the finger and thumb.

MEASLES.

This commences fairly suddenly with malaise, anorexia, coryza, and fever, which may reach 102° within twenty-four hours. There is sneezing and watering of eyes and nose, hoarseness and cough. The tongue is furred, and there may be diarrhœa; the second and third day the temperature may fluctuate or descend to normal, but it mounts on the fourth day to 103° or even 104°, as the rash comes out; this first appears at the junction of the hair with the face and cheeks and behind the ears; thence it spreads over the face, trunk, and limbs. It consists of deep, slightly-raised, rose-coloured papules about the size of a split pea,

often arranged in crescentic groups; they fade after two or three days and disappear, followed by a slight branny desquamation.

This disease has to be diagnosed at first from ordinary febrile catarrh, which is often impossible; but the fever of measles is generally higher than in catarrh, and when the rash appears there is no difficulty.

Rubeola resembles measles, but the symptoms of catarrh are less or absent; there is less fever, but some sore throat and enlargement of the glands beneath the sterno-mastoid. The diagnosis from small-pox has already been given.

RUBEOLA, OR GERMAN MEASLES (RÖTHELN),

resembles to some extent measles and scarlet fever. It begins with slight catarrh of the air-passages, but less sneezing and coughing than measles. There is slight sore throat, and the tonsils and fauces are reddened; there is some enlargement of the glands beneath the sterno-mastoid. The fever is slight, rarely up to 101° F.

The rash first appears round the mouth; on the first day of the illness it may spread to the trunk and limbs.

It consists of pale, very slightly-raised spots, rather smaller than measles, and not so well marked; they often fade in a few hours.

VARICELLA (CHICKEN-POX).

There may be a day or so of slight fever, but usually the rash is the first symptom; this comes out first on the trunk and scalp, and thence may extend to the face and limbs and mucous membranes. It begins as small red spots like those of enteric fever; these enlarge, and in a few hours show a vesicle on the summit about the size of a large pin's head; this often ruptures and forms a scab. They differ from small-pox in being quite superficial and not umbilicated. They itch intensely. These vesicles come out in crops for a day or two, while the child suffers from slight fever and malaise.

The diagnosis has chiefly to be made from small-pox, in which there are usually three days of preliminary fever, with vomiting and backache, before the rash comes out, and this first appears on the face as a rule. The diagnosis from modified small-pox is less easy, for in this sometimes the early symptoms are badly

marked; but the temperature usually falls to normal as soon as the rash appears, and this is usually better marked on the face than on the trunk.

ERYSIPELAS.

The onset is sudden, often with rigors, and the temperature mounts rapidly to 103° or 104° F. Soon some part of the skin, frequently the face near the side of the nose or eye, tingles and becomes swollen and red; this spreads till a bright red surface appears, raised at the edges, and in which on pressing the redness fades for the moment, leaving a yellow stain; the part swells more, and the surface may show blebs or vesicles. This spreads to a variable extent for a few days or a week, and then fades, leaving the skin slightly thickened and desquamating. The temperature generally remains at about 103° or 104° for four or five days, when it falls usually suddenly to normal or subnormal. The tongue is thickly coated, and there is anorexia, and sometimes vomiting or diarrhœa. The glands from the affected region become tender and enlarged.

The diagnosis is generally easy on account of the marked symptoms.

DIPHTHERIA.

This disease usually begins by increasing malaise, anorexia, and slight fever; after a day or two the throat becomes sore and swallowing painful.

On looking at the throat, there may at first be seen a grayish-looking membrane on a tonsil or a pillar of the fauces; this may be accompanied by swelling and redness of the uvula and soft palate, and the membrane gradually extends to this part. Round the membrane the mucous membrane is more or less reddened and swollen. The lymphatic glands of the neck become swollen and painful. There is frequently an acrid, blood-stained nasal discharge, due to specific inflammation of the nasal mucous membrane.

The temperature is rarely over 102°, but the patient generally looks more ill and prostrate than with a non-specific tonsillitis.

Sometimes the fauces are free of membrane, which is limited to the parts of the air-passages out of sight; then the hoarse voice, dyspnœa, often of spasmodic type, brassy cough, and

sometimes the expectoration of fragments of membrane, may help in the diagnosis when considered with the onset and course of the disease.

MUMPS.

After a day or two of malaise, or suddenly, aching and swelling begin over one parotid gland; this enlarges in all directions, and forms a firm, doughy swelling. A day or so later the other parotid swells, and generally also the submaxillary glands. This is accompanied by much local pain, some malaise, and slight fever, usually under 102° F. In from three to six days this swelling subsides without suppuration, though sometimes the testicles or ovaries are attacked by so-called metastasis.

This has to be diagnosed from the parotitis occurring in fevers, dysentery, etc.; this form is always unilateral, and frequently leads to suppuration.

CHOLERA

is a disease occurring in Europe in occasional epidemics. The onset may be sudden, or preceded by slight diarrhœa and malaise. Violent purging, first of bowel contents, then of a colourless, 'rice-water' fluid motion, which is alkaline, and contains numerous leucocytes, bacteria, lumps of mucus and albumin, but rarely blood. A similar fluid is vomited at frequent intervals. Cramps in the muscles of the limbs and sometimes of the trunk accompany this vomiting and purging. After some hours of this the vomiting and purging cease and the cramps lessen, and the patient falls into the stage of collapse, with an almost imperceptible pulse, and the urine is suppressed. This may end fatally, or reaction and secondary fever set in, to end in recovery or death.

The diagnosis of cholera during an epidemic is easy; the only disease resembling it in a marked form is poisoning by arsenic. But sometimes patients die from shock early, before even the true 'rice-water' vomiting and purging take place. Again, in some cases the symptoms are so slightly marked as not to be distinguished from so-called cholera nostras, or summer diarrhœa, and vomiting produced often by unripe or decaying fruit.

AGUE (MALARIA).

1. **Intermittent Fever** may or may not have a prodromal stage, and begins by the cold stage, in which the patient has a severe rigor and the temperature rises. After about half an hour of this the hot stage comes on, when the patient assumes the appearance of high fever, and his temperature is often 104° or 105° F., or higher. The skin is hot and dry, and the pulse full and bounding, and there is severe headache; after a variable time, about half an hour as a rule, sweating occurs, and becomes very copious, and the temperature falls to normal, the patient goes to sleep, and may wake feeling quite well.

These attacks may occur each day (quotidian ague), or every other day (tertian ague), or every third day (quartan ague), or occasionally a patient may have only one or two a year.

2. **Remittent Fever.**—This form is generally seen only in India and other places where malaria is endemic. The stages are like those of the intermittent form, only the temperature does not descend to normal in the intervals. There is usually marked vomiting, which sometimes contains blood. The disease lasts one or two weeks, and may end in death or recovery.

3. **Malarial Cachexia.**—Those who have suffered from ague frequently suffer from malaise and digestive disorders; the skin is pale and sallow. The spleen is felt to be enlarged and hard, and the blood contains dark pigment, and is deficient in hæmoglobin.

The diagnosis of intermittent fever may have to be made from pyæmia, the cause of which is concealed, and from other causes of intermittent pyrexia, such as ulcerative endocarditis. In cases of doubt the blood should be examined when in the red corpuscles, and sometimes free in the blood plasma may be seen round or oval bodies, often looking like vacuoles, and generally containing black pigment; these are the malarial parasites.

Remittent fever, on account of its vomiting, etc., may have to be distinguished from yellow fever, and the examination of the blood is of great importance. The malarial cachexia is diagnosed by a history of residence in malarial districts, of febrile attacks, and in the enlargement of the spleen, for which no other cause is found.

YELLOW FEVER

occurs chiefly in the West Coast of Africa and the West Indian Islands; it begins suddenly with rigors and prostration and febrile symptoms; the temperature mounts during the first two or three days to about 105° F. There is vomiting and epigastric pain, and the urine early contains albumin. Jaundice appears about the fourth day, and then hæmorrhages occur from the various mucous membranes, and a purpuric rash may appear on the skin. The urine may be entirely suppressed, and the vomit may contain dark blood, and blood may appear with the motions. The disease lasts about a week, but death may occur in two or three days.

RELAPSING FEVER

is rare in this country; the characteristic symptoms are rapid onset with rigors and rise of temperature to 104° or so the first day; the spleen becomes enlarged, and jaundice appears in a day or two. The fever, which has been continuous, remits on the fifth to the seventh day, and becomes normal for three to five days, during which the patient may feel well; but it rises again to about the same height as before, remaining up for three or four days, when it again falls to normal; a third pyrexial attack may follow.

The diagnosis has to be made from other fevers with acute onset, as small-pox, typhus fever, etc. This may be done in the early stage, if the blood be examined and the spirillum peculiar to this disease be found; this is always present during the pyrexia, but not in the apyretic intervals. It is a curved, rod-shaped organism, about twice as long as the diameter of a red corpuscle, and easily seen in the unstained blood.

WHOOPING-COUGH

begins by a prodromal stage of febrile catarrh, lasting a few days to some weeks; then the characteristic stage comes on. The cough is infrequent, but very severe; it begins by a succession of short expiratory efforts, without any intervening inspiration; then occurs a long inspiration, with often a whooping sound; then more coughs and other inspirations, till finally the child may get very cyanotic, with swollen face and staring eyes.

Hæmorrhages may occur from the nose or under the conjunctivæ, or the child may vomit. Between these attacks of cough the child may appear to be well.

The diagnosis of an attack in which the child whoops is easy, but if no whoop be present the diagnosis may rest on the following points: Infrequency of the cough and its severity, or the occurrence of epistaxis or vomiting.

For the sake of diagnosis, fevers may be divided into those in which the onset is sudden or rapid—as typhus, small-pox, scarlet fever, erysipelas, cholera, yellow and relapsing fevers—and those in which the illness is preceded by a few days of slight malaise—as typhoid, diphtheria—or in which the onset is marked by very slight symptoms only—as measles, varicella, rubeola, etc.

TYPHOID FEVER

may have to be diagnosed during the first, second, or third week.

1. During the first week there is a gradual onset of illness, the characteristic symptoms of which are drowsiness, continuous headache, gradually-increasing fever, and perhaps epistaxis or vomiting. The tongue is furred, and the bowels as a rule loose.

2. Second week. About the seventh day of the disease the temperature has often reached 103° or 104° (see chart), and the patient takes to bed; the headache often ceases, and delirium occurs at night. The abdomen often gets tender and somewhat distended, and the spleen can be felt below the ribs in about one-third of the cases.

The rash appears between the seventh and fourteenth days; it is generally scanty, and seen over the upper part of the abdomen and lower part of the chest in the form of sparse rose-red papules, the colour fading on pressure; the papules are slightly elevated, and each lasts four or five days; they appear in successive crops. This rash, however, may be absent, especially in children.

Towards the end of the second week the pulse, which is usually between 100 and 120, may become dicrotic and very compressible. At this time bronchitis at the bases of the lungs is very characteristic. The bowels are generally loose, and there may be three or four light-coloured alkaline and offensive motions a day, or the bowels may be very constipated, and only

open by enemata. The tongue becomes dry, often furred, and showing transverse cracks, or it may be dry and morbidly red and clean.

3. The third week the temperature generally begins to descend slowly, falling two degrees each morning and rising one each evening, to become normal towards the end of the week. The tongue tends to clean and become moist; the motions are either frequent and loose or constipated; the patient remains very prostrate, but the delirium may clear up; the pulse remains weak, and often dicrotic. The lung signs may clear up; the abdomen becomes less tender and less full; and the spleen, if enlarged, diminishes in size.

The diagnosis of enteric fever has to be made from typhus fever, general tuberculosis, tubercular peritonitis, and sometimes from typhlitis, pyæmia, ulcerative endocarditis, and central pneumonia. Typhus fever is distinguished by its acute onset, different rash, and early prostration.

Tuberculosis in children presents great difficulties, for the lung signs may be mistaken for those of bronchitis, and the other symptoms may much resemble typhoid; but the temperature of tuberculosis is generally more fluctuating, and the rash of enteric, if present, is characteristic. Again, the intestinal symptoms are frequently less marked in tuberculosis than in enteric, without there be accompanying tubercular peritonitis, when the diagnosis has to be made chiefly from the type and course of the fever.

In pyæmia, the origin of which is not obvious, and ulcerative endocarditis, the diagnosis chiefly depends on the temperature, which in these diseases is usually more fluctuating in type.

N.B.—Widal has recently introduced a test for typhoid fever; the following is the process: The finger of the suspected case is washed, and a few drops of blood withdrawn from a prick into a pipette; this is diluted with normal salt solution after clotting has occurred. This diluted serum is mixed with a fresh culture of typhoid bacilli; the bacilli become motionless and form into characteristic clumps. If the serum do not come from a typhoid case, or one which has had typhoid within three years, the bacilli move about in the usual way, and are distributed all over the field of the microscope. This test does not appear earlier than the end of the first week of the disease.

CHAPTER III.

DISEASES OF THE RESPIRATORY ORGANS.

Symptoms.

I. **Dyspnœa** may be caused by—

1. Disease of respiratory organs, as emphysema, asthma; especially if of rapid onset, as pneumonia, pleurisy, etc.

2. Pain in the chest, as in pleurisy or pleurodynia.

3. Abdominal distension from flatulence or ascites preventing free action of the diaphragm.

4. Heart diseases.

5. Obstruction of air-passages, as in diphtheria, œdema of the glottis, spasm of vocal cords, laryngismus stridulus, or narrowing from pressure by tumours or aneurisms in the chest.

N.B.—When the obstruction is at the glottis, the respiratory excursion of the larynx is excessive; this does not happen if the obstruction be lower down.

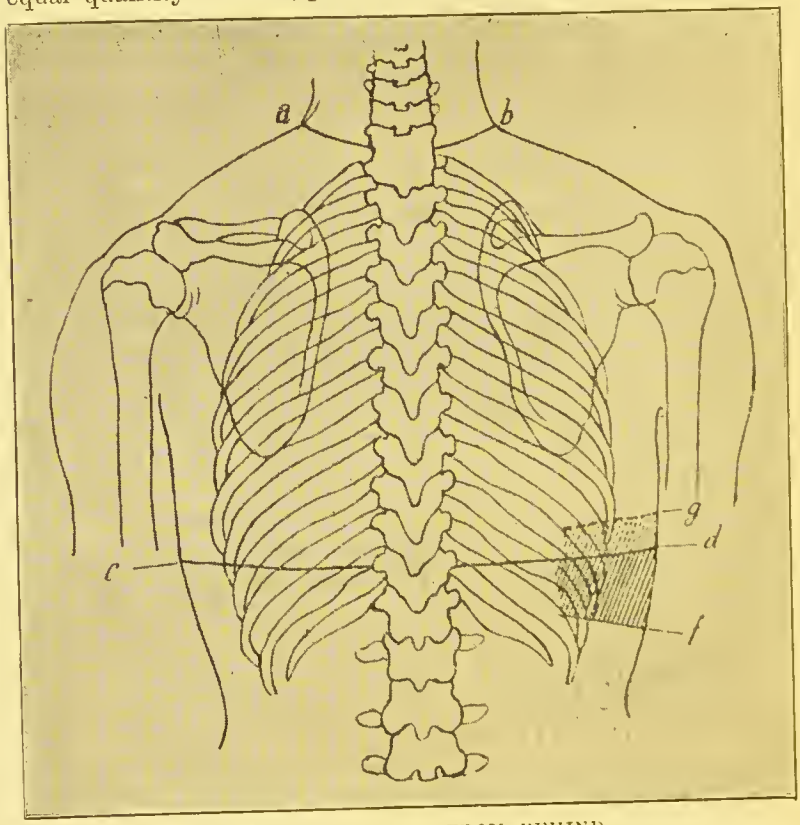
6. Blood states, as anæmia, uræmia, diabetes, or fevers.

II. **Orthopnœa** is not a common symptom of lung disease, but is more common in heart disease, or in ascites from any cause.

III. **Cough** may be due to disease of any kind of any part of the respiratory organs. It is specially hacking when the pleura is inflamed. Other causes of cough are: inflammation of the fauces, including elongation of the uvula, gastric cough, ear cough (often due to wax in the ear), tooth cough.

IV. **Expectoration.**—The amount may vary greatly; it is most in bronchorrhœa (muco-pus) or in laryngitis (frothy and watery). It may be (1) watery, as in laryngitis frequently; (2) mucoid, as in early bronchitis, pneumonia or pleurisy; (3) muco-pus, as in chronic bronchitis, etc.; or (4) nearly pure pus, as in phthisis, empyema opening into the lung, etc. It is very fœtid in gangrene of the lung, bronchiectasis and putrid bronchitis; this is due to bacteriological infection and the formation of fatty acids, which may be seen occasionally as needle-shaped crystals —'Charcot's crystals'—in the sputum. These fœtid sputums separate on standing into three layers: the upper one frothy, middle one of muco-pus, and a lower granular layer of micro-organisms, lung débris, etc.

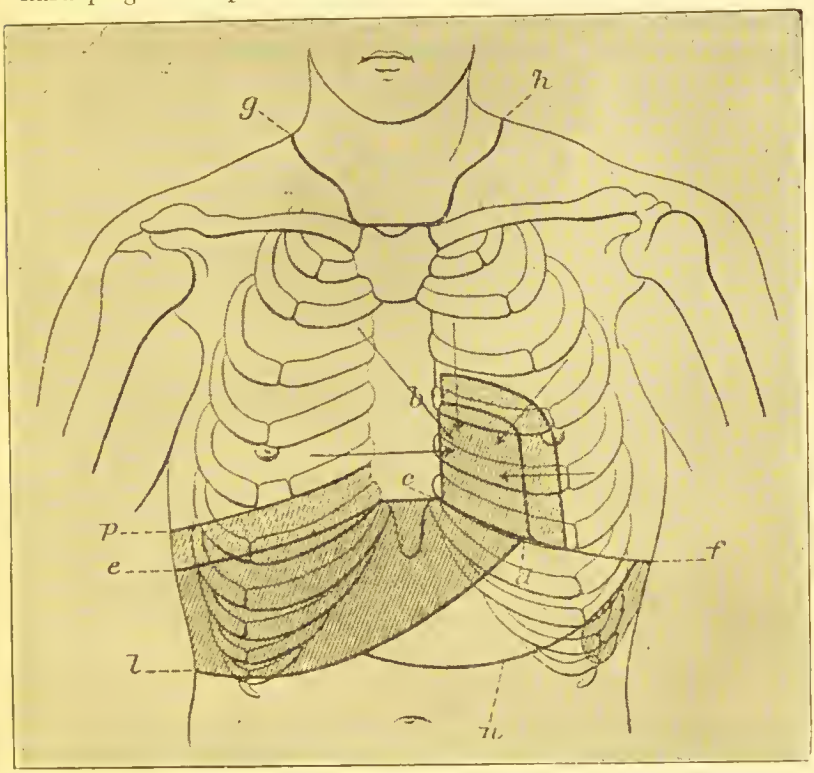
Microscopically, sputum may contain: (1) ciliated epithelial cells from the trachea or bronchi; (2) flat epithelium from the mouth or pharynx; (3) white or red blood corpuseles; (4) pus corpuseles; (5) small round or oval flat cells from the alveoli; (6) mueus; (7) elastic fibres. To get these, boil sputum with an equal quantity of KHO, pour into a wineglass half full of water,



LIMITS OF PLEURA FROM BEHIND.

and microscope the sediment when collected. They may sometimes show an alveolar arrangement, and are an absolute proof of breaking down of lung tissue. (8) Tuberele bacilli. These may be demonstrated by putting a morsel of thiek sputum on a cover-glass, forming a thin layer by pressure of another cover-glass, passing quickly three times through a spirit-lamp flame, placing on the cover-glass a few drops of eoncentrated aleoholic solution of fuchsin, warming gently till steam rises, then wash-

ing in water, decolourizing by placing for a second or two in a 50 per cent. watery solution of nitric acid, then staining slightly in a watery solution of methyl blue, drying and mounting in Canada balsam. The bacilli are stained red on a blue ground. (9) Curschman's spirals occur in fibrinous bronchitis, in which hard plugs are expectorated; these teased out on a slide show a



LIMITS OF PLEURA, ETC., FROM THE FRONT, WITH THE DULNESS DUE TO THE HEART AND LIVER.

central thread surrounded by spiral threads; a low power only is necessary. They occur in bronchial asthma. (10) Small rhombic hæmatoidin crystals are seen sometimes after bleeding from the lung; fatty acid needles; cholesterine crystals, which are fat rhombs with broken edges. (11) Rarely echinococcus hooklets or heads are found in sputum. (12) Fränkel's pneumococcus may be found in cases of acute pneumonia. (13) Actinomyces is found in sputum. It is a small sulphur-yellow body,

the size of a small pin's head, which, put on a slide and pressed by a cover-slip, shows the characteristic clubs radiating from a centre of interlaced mycelium.

V. **Hæmoptysis.** — Blood may come from the respiratory passages in large or small quantities. If in large amount, it is bright red, clots quickly, is frothy and alkaline in reaction, and is expelled by coughing, and not by vomiting. The cause usually is the bursting of a vessel in a phthisical cavity, or the bursting of an aneurism into the trachea or bronchus, or from congestion or infarction of the lung in mitral disease, particularly mitral stenosis.

Very small quantities of blood may be brought up either in thin bright streaks, intimately mixed with the sputum or diffused evenly through the sputum, as in the rusty sputum of pneumonia, or the red-currant-juice sputum of malignant growth of the lung, or the anchovy-sauce sputum of an abscess of the liver discharging through the lung.

The force of cough may also cause slight bleeding from the pharynx; in this case the blood is darker in colour, and not mixed with the sputum, but lies beside it.

When blood comes from the lung, in nearly all cases sputum streaked or coloured with blood continues to be expectorated for a few days after, which is not the case with blood from elsewhere.

The usual causes of slight hæmoptysis are phthisis, acute bronchitis, lobar pneumonia, impaction of a foreign body in a bronchus, and possibly emphysema. Other occasional causes of hæmoptysis are kidney disease, blood diseases, as scurvy or hæmophilia, and possibly a form vicarious to menstruation.

The examination of the respiratory system should commence by that of the voice and larynx.

Aphonia may be caused by:

1. Chronic laryngeal catarrh, when the laryngoscope shows congestion of the larynx, with white threads of mucus adhering to the cords, and the cords may fail to adduct properly, owing to phonation. Any specific laryngitis, such as in diphtheria or measles, may cause hoarseness or aphonia.

2. Tubercular laryngitis is generally associated with lung infection; there is often pain and dysphagia, pyriform swellings over the summits of the arytenoid cartilages are typical, and

generally there is swelling of the false vocal cords, and perhaps tubercular ulcers of the cords.

3. Syphilitic laryngitis. In this there may be either catarrh, gummata, or deep ulcers, with necrosis of the cartilages; these later may contract and cause stenosis of the larynx.

4. Epithelioma is somewhat rare.

5. Hysterical aphonia is recognised by the fact that the patients can cough and sneeze as usual, so there is no true paralysis of the adductors.

6. Paralysis of the adductors is usually only of the left side, and the patients talk fairly well, but the words are divided, breaths being taken more frequently than usual, there being a loss of air during phonation. It is easily recognised by the laryngoscope, and is generally dependent on pressure on the inferior laryngeal nerve by tumours, especially aneurism of the transverse part of the aortic arch.

Stridor may be due to foreign bodies, pressure on or stenosis of the larynx, trachea or bronchi, or to spasm of the adductors or weakening of the abductors of the larynx. If the stenosis be situated in the larynx, the laryngeal excursion is greatly increased.

Examination of the Chest.

The normal limits of the lung are, upwards, 1 to $1\frac{1}{2}$ inches above the clavicles; from that point their anterior edges descend, almost touching behind the sternum, to the insertion of the fourth rib cartilage; from thence the right lung curves outwards, still descending, and following nearly the direction and level of the sixth rib cartilage, till in the mid-axilla it is in about the seventh or eighth rib; thence slightly downwards, till in the scapula line it is behind the tenth rib, till nearing the spine it is at the level of the ninth vertebral spine.

From the fourth rib cartilage the edge of the left lung bends outward behind the fourth rib cartilage nearly to the nipple; then its small process (the lingula) curves forwards over the pericardium; it then descends to the sixth rib in the nipple line, the seventh or eighth in the mid-axilla, and the tenth in the left scapula line.

The septa between the lobes start from the second dorsal spine in a curved line, crossing the scapula below the spine, and

leaving it just superiorly to its angle, and continuing the same direction forwards and downwards to just below the nipple and onwards to the sixth rib cartilage; this is the same in both lungs. On the right side, a septum starts from the middle of the line described just above the angle of the scapula, and goes directly forwards to the junction of the fourth rib cartilage with the sternum.

The pleural boundaries follow that of the lung, but inferiorly extend about ¾ inch lower.

Shape of Chest.—There are two shapes of chest which are especially seen in phthisical subjects — one the long, narrow, flat chest, called phthisioid, where the ribs are very oblique, and the intercostal spaces and subcostal angle small; the alar-chest resembles this one, but is characterized by great projection of the blades of the clavicles. Pigeon breast is when the sternum projects greatly below, and the sides of the chest slope from it; the sterno-vertebral diameter is very large. Funnel-shaped breast is a deep depression in the lower part of the sternal region; this may be congenital or produced by pressure, as by a shoemaker's last. The barrel-shaped chest is round and increased in all diameters, the ribs are more horizontal, and the interspaces and subcostal angle widened; it is seen in emphysema.

The chest may be asymmetrical, owing to bulging on one side from emphysema, pleural effusion, or pneumothorax, or contraction of a side after pleurisy, occasionally after pneumonia and phthisis or fibroid phthisis; in the latter cases the shoulder of that side is lowered, and the angle of the scapula depressed and rotated forwards.

Occasionally, especially in children, liver enlargement gives rise to local bulging at the right base, or pericardial effusion or enlarged heart produce a bulging of the precordium.

In those who have angular or lateral curvature of the spine there may be great deformity and asymmetry of the chest.

Enlarged veins on the chest wall in men indicate pressure within the thorax by enlarged glands, tumours, or aneurism; in women who have borne children they have no significance.

Movements of the Chest.—The breathing is usually both thoracic and abdominal. In old people, with ossified costal cartilages, the thoracic movements are very slight and the diaphrag-

matie respiration increased, as ean be seen by the movements of the abdomen in respiration. Paralysis of the diaphragm eauses the absence of these movements; they are also absent in eases of acute peritonitis, diaphragmatie pleurisy, etc.

Thoraeie movements are of two kinds—expansion and elevation. One side of the chest may move better at the apex or base than the other; the side of least movement is always the diseased side.

Besides diseases of the lungs and pleuræ, perieardítis often eauses diminished ehest movement on the left side.

Portions of the ehest may show a sinking in of the intereostal spaees during inspiration; this shows either consolidation of that part of the lung or that the bronehus going to it is obstrueted; this is seen in eollapsed lung, in eases of diphtheria, etc. Sometimes the inspiratory movement is very short, and the expiration prolonged and laboured, as in emphysema, with or without asthma.

The rhythm of breathing may vary in a regular way, as is seen in 'Cheyne-Stokes respiration,' where intervals of apnœa alternate with intervals of increased respiratory movements. It is seen in meningitis, hemiplegia, and other brain affeetions, in hæmorrhage, heart weakness (espeeially fatty heart), urræmia, opium-poisoning, and in deep coma.

Palpation.—This is useful to confirm inspection, especially with regard to equality of ehest movements, and also whether the movement eonsists both in expansion and elevation; and by it the size and equality of the costal angle ean be made out.

Voeal fremitus is the vibration of the chest occurring when the patient speaks. A deep ehest note elicits it best, and the word 'ninety-nine' is usually used. It is more marked in adults than ehildren, and in males than females, and on the right side than on the left. It is diminished by thick parietes, emphysema, thickened pleura, œdema of the lung, tumours in the lung, etc. It is lost in most eases of pleural effusion, pneumothorax, empyema, or hæmorrhage into the pleura. It is increased by lung eonsolidation, as of pneumonia, phthisis, and bronchopneumonia, and, rarely, in some cases of slightly-thickened fibroid pleuras.

Fremitus due to rhonchi, called rhonehial fremitus, is felt in some eases of bronchitis, etc.

Pleural fremitus occurs occasionally in pleurisy when little or no fluid is exuded.

Pulsation in the chest, mostly on the left side, outside the cardiac area, is sometimes felt in cases of empyema; it is synchronous with the cardiac systole.

Percussion of Chest.—The note obtained by percussion varies with the amount of external covering of the chest wall; as this is generally fairly equal on both sides, it can be allowed for.

Absolute dulness of a part of the chest is mostly due to fluid in the pleural sac, which may be serum, pus, or blood. Extensive solid tumours or aneurisms of the chest may also give an absolutely dull note.

The percussion note may be impaired (1) from any cause diminishing the amount of air-containing tissue in the chest, as from the consolidation of acute lobar pneumonia, broncho-pneumonia, the various stages of phthisis, collapse or infarction of a portion of the lung. Tumours or aneurisms in the mediastinum may give local dulness behind the upper part of the sternum. (2) From thickened pleura, or some cases of pneumothorax, where the intrapleural pressure is very great or the pleura much thickened.

The chest should be percussed both lightly and forcibly, as sometimes one, sometimes the other, best shows a deficiency.

The normal lung limits have been stated, but the right base is often deficient, especially to heavy percussion; this is due to the presence of the liver. Frequently the normal superficial cardiac dulness is deficient or lost; this indicates emphysema, which also often causes a downward displacement of the upper edge of the liver dulness, normally at the level of the fifth rib in the nipple line.

The limits of dulness in the chest should be carefully marked out, especially at the base of the chest; that due to pleural effusion has a horizontal limit at the back, frequently rising slightly in the axilla, while that due to pressure of the diaphragm upwards, by abnormal intra-abdominal pressure, or to hydatid of the pleura, has generally a rounded upper margin in the thorax.

Auscultation.—The qualities of breath sounds to be noted are the quality, pitch, intensity, duration, and rhythm; these expressions explain themselves.

The chief types of breathing are vesicular, bronchial, tubular, cavernous, and amphoric.

Vesicular breathing is that heard on listening to the chest of a healthy adult; recognition of the quality comes only by practice. The expiration is almost inaudible. In children under twelve the breathing has a harsher quality, which is called puerile breathing.

Bronchial breathing is heard in the healthy adult in the interscapular regions, and in females occasionally in the right subclavicular region. The quality is harsher, the pitch higher, and the expiration is much better heard than natural and more prolonged, and both inspiration and expiration have a blowing character. It is heard in all cases of slight consolidation of lung substance, except there be a sufficient quantity of healthy tissue between its place of origin and the surface to mask the morbid sounds, or fluid, solid or gaseous accumulation in the pleura interfere with its conduction.

It is heard in compression of lung from any cause, collapse, the consolidation stage of phthisis, in tumours of the lung, and resolving pneumonic consolidation.

Tubular breathing is that heard normally over the trachea; the inspiration and expiration appear of equal duration, and both are of metallic quality, high pitch, and have a whiffing character, like the sound produced by blowing sharply through a metallic tube.

It is heard in cases of complete consolidation of lung, especially in acute lobar pneumonia, and occasionally in phthisical consolidation, or broncho-pneumonia, collapse or compression of lung, and sometimes in cases of tumours between the bronchus and chest wall.

Cavernous breathing gives to the ear the impression of hollowness of quality; it may also be rather metallic or of lower pitch than tubular breathing, and the expiration is usually of a lower pitch than the inspiration.

This is heard often over vomicæ in phthisis, which communicate with bronchi, also in bronchiectasis (in which case it is usually heard about the angle of the scapula); rarely it may be heard in pneumothorax.

Amphoric breathing is merely an intensification of cavernous,

and is heard under the same conditions. It has been so called from its resemblance to the sound produced by blowing into an empty jar.

Besides these peculiarities of the breath sounds, there are others which must be noted.

The inspiratory sound may be very short, as in emphysema, asthma, etc., or where the chest wall is rigid, as in old people, and expansion is therefore deficient.

Jerking respiration, when inspiration seems to consist of a series of short sounds instead of a longer continuous one, occurs whenever the inspiration is attended by pain, and is seen in pleurisy, early phthisis, also in hysteria and spasmodic affections of the air-passages. It is also called **cogwheel** breathing.

Divided respiration is when the expiratory sound is divided by an interval from the preceding inspiration; it is heard in emphysema, and is a characteristic of bronchial breathing.

Deferred inspiration is when the chest movement begins at an appreciable interval before the inspiratory sound; this occurs in emphysema.

Adventitious Sounds—

(*a*) In the lung. These are divided into:

- Rhonchi { sonorous. / sibilant.
- Rales { crepitant. / subcrepitant. / small, medium, large } mucous rales. / bubbles.
- Consonating rales.
- Crackles.
- Clicks.

(*b*) In the pleuræ:

- Rubbing, Creaking, Cracking } friction sounds.

(*c*) Laryngeal sounds.

Sonorous rhonchi are dry-sounding, low-pitched noises heard in inspiration or expiration, or both, produced by the vibrations of secreted matters in the bronchial tubes, and sometimes perhaps

by a thickening of the bronchial mucous membrane. They are heard in bronchitis and asthma.

Sibilant rhonchi are dry, high-pitched sounds, generally of a whistling character, and heard under similar conditions to the preceding.

Crepitant rales are very small, short sounds resembling those produced by rubbing hair between the fingers; they are produced in collapsed lung, the first and third stages of acute pneumonia, catarrhal pneumonia, infarction or œdema of lung, and occasionally at the commencement of softening of lung tubercles. They are heard in inspiration only, and are supposed to be produced in the alveoli themselves.

Subcrepitant rales are rather larger sounds than the last, and heard under similar conditions.

These two last kind of rales are often described as **clicks** and **crackles**.

The small, medium, and large mucous rales are produced in the bronchi or small cavities of the lung; they have a moist quality, and are heard in all conditions of inflammation of the bronchial tubes, when mucus or muco-pus is secreted.

Bubbles are heard in dilated bronchial tubes or lung cavities, and hence are chiefly heard in the excavation stage of phthisis or in bronchiectasis.

Consonating rales have a peculiar clear or ringing quality, and are heard in cases of lung consolidation, especially in phthisis.

Pleural friction sounds may be moist or dry in quality; in the former case they resemble small intrapulmonary rales, but are usually more superficial sounding. If dry they may resemble the creaking of leather, or the sound heard on cutting the heart of a raw cabbage; they are generally heard only in inspiration, and, if slight, chiefly at its termination; they are usually heard best towards the base of the lung, where the expansion is most marked. They are heard in cases of inflammation of the pleura where the pleural surfaces are not separated by fluid, and hence in simple pleurisy, pleuro-pneumonia during and after the absorption of pleuritic effusion, over lung infarcts or phthisical processes, and occasionally in miliary tuberculosis and emphysema.

Laryngeal Sounds.—Various sounds arising in the larynx or

trachea, through diminution of their calibre by external pressure, changes in their walls, or impaction of foreign bodies, may be conducted to any part of the lung; they are differentiated by their presence throughout all parts of the lungs and the knowledge of a cause.

Auscultation of the Voice.—If one listens over the lungs of a healthy adult while he speaks, one hears an indefinite noise, called the vocal resonance. When this is increased, but unattended by distinct articulation, it is called **bronchophony.** It is heard where the pulmonary tissue is denser than natural, either from infiltration with some added material, as pneumonic or tubercular consolidation, or infarction of the lung, or collapse of the lung from various causes, including pleural effusion, though a layer of fluid, if thick, may prevent the conduction to the ear. It is also heard in health where bronchi exist near to the surface, as in the interscapular region, and occasionally at the apex of the right lung, especially in women.

Pectoriloquy is the term applied to increased vocal resonance, when the sound of the voice is increased, and appears as if it came from directly under the stethoscope, and the words are distinctly articulated; it is best elicited by making the patient whisper, and then is called 'whispering pectoriloquy.' This is heard most distinctly over phthisical cavities which communicate with a bronchus and contain much air; also frequently over dilated bronchi, and when absolutely consolidated lung exists between the chest wall and a bronchus, as is sometimes the case in intense pneumonic consolidation.

Ægophony is a vocal resonance of a tremulous, nasal, and cracked character, like the bleating of a goat or the voice of Punch. It has a distant character, and is said to be produced by the fundamental tone of the voice being lost while the overtones are transmitted. It is heard in some cases of moderate pleuritic effusion, and generally about the angle of the scapula.

Vocal resonance is *feeble* or *absent* over a portion of lung which is a bad conductor, as in emphysema, or when sometimes air or fluid in the pleura diminish the conducting power, or when the bronchus is blocked from any cause, such as by a foreign body, exudation, pressure from without, as from tumours, etc.

Metallic tinkling may occasionally be heard over large

cavities or pyo-pneumothorax; it is essentially due to the echo of a bubble formed in the liquid they contain. It may be due to the fall of a drop from the upper wall into the liquid below.

Bell sound is the ringing echo of a sound produced by the chinking together of two coins on the chest wall over the situation of a pneumothorax. It is heard by a stethoscope applied over the part. Very occasionally the same sound may be heard over a thin-walled phthisical vomica near the surface of the chest.

Succussion Splash.—Sometimes in pyo-pneumothorax, on shaking the patient while the ear is applied to the back of the chest, a splashing sound is heard.

EMPHYSEMA.

1. **Symptoms.**—Habitual shortness of breath and occasional cough. Now and then paroxysmal dyspnœa, like asthma, comes on; or there are frequent attacks of bronchitis. In late stages there are evidences of the obstruction to the pulmonary circulation, such as cyanosis, even dropsy of the legs and abdomen, with congestion of the abdominal viscera.

2. **Physical Signs.**—The chest becomes more circular in shape—the so-called 'barrel chest'—the ribs being more horizontal, and the costal angle widened. Thoracic breathing is slight, while the action of the diaphragm may be increased. Epigastric pulsation may occur from one or both of two causes, either from depression of the heart or from enlargement of its right side; and the apex beat is often not seen or felt. Vocal fremitus is lessened, the percussion note is hyper-resonant, and the superficial cardiac dulness is absent, while the upper limits of the hepatic dulness are lower than normal, and the percussion note at the posterior bases is frequently resonant below the costal margin. On auscultation the inspiration is short, and the expiration prolonged and wheezy, and the signs of concurrent bronchitis are frequently present.

ACUTE BRONCHITIS.

1. **Symptoms.**—Onset with chills and fever up to 101° or 102° F.; frequently pain and soreness behind the sternum;

cough at first dry, and later with expectoration of frothy mucus, which may be streaked with blood. There is often much dyspnœa and cyanosis.

2. **Physical Signs.**—Rapid breathing, often with working of the alæ nasi and other accessory respiratory muscles ; rhonchial fremitus. On auscultation breath sounds are obscured by numerous sibilant and sonorous rhonchi, and mucous rales of various sizes.

CHRONIC BRONCHITIS.

1. **Symptoms.**—Cough, with varying amount of expectoration, mucoid, muco-purulent or purulent; dyspnœa, and perhaps occasional severe paroxysms of difficulty of breathing. The temperature is rarely raised more than a degree.

2. **Physical Signs.**—There are usually the signs of emphysema, and also rales and rhonchi heard all over the chest, especially at the bases of the lungs.

BRONCHIECTASIS,

or dilatation of the bronchial tubes, is most frequent in children or old people who have suffered from chronic bronchitis with profuse expectoration. The symptoms are simply cough, dyspnœa, and lividity, with expectoration, at intervals of some hours, of offensive purulent sputum in large quantity. The patients have sallow skins, waste much, and there is usually clubbing of the fingers and toes. The physical signs may simply be those of chronic bronchitis, or sometimes there may be dulness and cavernous breathing, with bubbling rales at one or other base, the most characteristic position being near the angle of the scapula.

ACUTE LOBAR PNEUMONIA.

1. **Symptoms.**—Onset sudden, with rigor, or in children a convulsion. Early prostration. Respiration very hurried, the pulse-respiration ratio often being 2 to 1. Usually sharp stabbing pain in the side, increased by cough. At first there may be no expectoration, and this may be absent throughout. If present, it is at first white and mucoid, later tinged with blood (rusty sputum), very viscid, finally may be purulent or watery, or in appearance like prune-juice. There is cyanosis,

and much working of the alæ nasi and accessory muscles of respiration. There may be herpes on the lips.

2. **Physical Signs.**—During the first stage of engorgement the physical signs are diminished movement of the affected side, with feeble breath sounds, and a few fine râles on deep inspiration.

During the stage of red hepatization the movement of the affected side is diminished and the vocal fremitus increased; there is dulness to percussion, and on auscultation tubular breathing and bronchophony, also—as a rule a few small crepitant râles.

During the resolving stage the râles become larger, till they may be described as subcrepitant or mucous râles, the breathing gradually loses its tubular quality, and the lung expands more on inspiration. The dulness persists to some extent, and is usually the last abnormal physical sign to disappear.

The diagnosis may often be made early by the rigor and sudden rise of temperature with the chest symptoms; the temperature is continuous till it falls abruptly by crisis—as a rule at the end of the first week.

BRONCHO-PNEUMONIA.

This is most frequent in young children or old persons, and comes on in the course of bronchitis; the temperature rises often to 103° or 104°, but is intermittent in type; with the rise of temperature other febrile symptoms appear, the breathing gets very hurried, and there may be more or less cyanosis and loss of strength.

On examination of the chest, areas may be found, most commonly at the posterior bases, where the percussion note is impaired and the breathing tubular or metallic in quality, and accompanied by numerous sharp, fine râles, which are much smaller and sharper than the bronchitic sounds which may be heard elsewhere. The vocal sounds also are increased over these areas, which often are found on both sides of the chest.

Sometimes no other physical signs than those of bronchitis can be made out, but the increase of temperature and its intermittent character, with the cyanosis and other signs of increasing illness, should lead to a suspicion of its presence.

SIMPLE DRY PLEURISY.

This varies very greatly, from simply slight febrile symptoms, with a pain in the side on taking a deep breath, over the site of which a râle may be heard on auscultation, to a more acute illness, beginning by chilliness, during which the temperature mounts to 101° or 102°, and there is severe pain in the side, usually about the axilla or nipple, though it may be referred to the abdomen. There is dyspnœa, and pain prevents the patient lying on the affected side. The movement of the affected side is limited, and there may be slight impairment of percussion note; the breath sound is weak over this region, and during or at the end of inspiration a friction sound is heard; this varies much in character, sounding sometimes like the creaking of leather, or of a moister character, like the râles of bronchitis; but it generally has a superficial sound, as if produced just beneath the stethoscope.

PLEURISY WITH EFFUSION.

Symptoms.—Usually begins with a feeling of chilliness and a rise of temperature to about 101° or 102°; there is a stitch-like pain in the affected side, and a cough which is often dry, but may be attended by the expectoration of mucus. The temperature as a rule descends in a few days, but may remain raised for weeks, especially if the fluid remain or become purulent.

Physical Signs.—There is diminution of movement on the affected side, which is rounded, and the intercostal spaces bulge. Vocal fremitus is lost over the fluid, and here the percussion note is absolutely dull and toneless. The breath sounds vary; as a rule, they are feeble or absent; sometimes they may be of a bronchial character, especially near the spine. The voice sounds are absent or feeble, except near the upper level of the fluid, where there may be ægophony.

If there be a fair amount of fluid, the heart is usually displaced to the opposite side, especially if the effusion be left-sided; this causes a displacement of the apex beat and of the normal cardiac dulness, and the heart sounds are best heard over the region to which the heart is displaced.

If the effusion be very great—*i.e.*, above the second rib in front—there will be displacement of the diaphragm of that side, and so the liver will be depressed with a right-sided effusion, and the spleen and stomach when the effusion is on the left.

The level of a moderate pleural effusion is often higher in the axilla than elsewhere; this may be a point of distinction from a subdiaphragmatic abscess or hydatid cyst of the liver, the dulness of which, if it encroach on the chest, is usually highest about the line of the angle of the scapula.

Besides the above-mentioned signs, there is usually a peculiar hyper-resonant or subtympanitic percussion note over the upper part of the lung above the level of the fluid; this is sometimes called the 'skodiaic resonance.'

EMPYEMA.

The recognition that pleural fluid has become purulent is often difficult except by aspiration; the chief points suggesting it are: (1) Long continuance of the signs of effusion; (2) long-continued elevation of temperature (though even with large empyemata the temperature may be quite normal); (3) development of clubbing of fingers and toes; (4) wasting and general malnutrition.

The diagnosis is rarely a certainty, and the withdrawal of a small quantity of the fluid is generally easy and safe.

An occasional but rare sign seen in some large empyemata on the left side is pulsation, evidently transmitted from the adjacent heart. This might perhaps be mistaken for aneurism, but for the fact that there is no large artery in this situation, for the empyema in this case lies as a rule in the region of the left nipple.

PHTHISIS.

The diagnosis of this at an early stage is of great importance, and often presents serious difficulty; the patients often complain of symptoms of anæmia, dyspepsia, hoarseness or aphonia, or of pleurisy or wandering chest pains; in all cases like this the chest should be carefully examined, especially at the apices in front and behind, when, if phthisis be present, one or more of the following symptoms and physical signs may be detected.

Symptoms.—A history of some months' or years' malaise,

with occasional cough and pains in the chest and excessive sweating at night; emaciation and loss of strength, occasional dyspepsia, etc. These with a family history of phthisis are very suggestive.

Physical Signs. — (1) In the early stage: the patient is often languid and anæmic, has a cough either dry or with expectoration of mucus, which at times may contain streaks of blood, or sometimes a large quantity of blood may be coughed up by a patient who has had no previous symptoms of phthisis. The temperature is as a rule raised one or two degrees in the evening, but in the morning is frequently normal. The chest is often long and flat and thinly covered; there may be diminished movement at one or other apex; the vocal fremitus may be diminished or increased as the pleura or lung is most affected. The percussion note is slightly impaired, and the breath sounds feeble or interrupted or bronchial, while a few moist sounds may be heard at the end of a deep inspiration, and these râles are not removed by coughing.

It must be remembered that the movement of the left side of the chest is frequently less than the right in a healthy person, and that at the right apex, especially in women, it is not uncommon to get the breath sounds of a bronchial character, and some increase in the voice sounds as compared with the opposite side.

(2) In a more advanced stage, the movement of the affected side will be more impaired, and there may be some flattening, best marked beneath the clavicle.

The vocal fremitus is usually increased, and the percussion note dull, except much accompanying emphysema be present. The breath sounds will be bronchial, and accompanied by sharpish râles and clicks. The vocal resonance will be increased (bronchophony). By this time the expectoration will be less mucoid and more purulent in character, and often is stained with blood; it contains elastic fibres and tubercle bacilli. The patient will have got thinner and weaker; the evening temperature will as a rule be higher, up to 102° or 103°, while it drops to normal or nearly normal in the morning. There will be frequent exhausting night sweats, and often some irregularity of the bowels, while in women the catamenia are often scanty or absent.

(3) The third or cavity stage of phthisis is usually attende by frequent cough, with expectoration of purulent nummular sputum, and occasionally by copious hæmoptysis. There is great and increasing weakness and wasting, frequent night sweats, constant remittent or intermittent fever, often clubbing of the fingers and toes, cyanosis, etc. The voice is often husky or lost, the bowels loose or irregular, etc.

The physical signs are, as a rule, those of extension of consolidation, with the signs of cavities, chiefly at the apices of the lungs, with frequently retraction of the chest beneath one or both clavicles.

N.B.—In some cases the early symptoms of phthisis are very slight and badly marked, and in some the first marked symptom is an attack of hæmoptysis; this variety has been named phthisis ab hæmoptoë.

PNEUMOTHORAX.

1. **Symptoms.**—Occurring during the course of phthisis, and occurring on the side of the chest most affected, there may be no symptoms, and it may only be discovered by physical examination. The symptoms when present begin suddenly with a sharp pain in the chest, and a sensation that something has given way within. Great shock and urgent dyspnœa, with cyanosis and, as a rule, orthopnœa.

2. **Physical Signs.**—Obliteration or bulging of the intercostal spaces on the affected side, with absent or lessened respiratory movement; abolition of vocal fremitus; tympanitic percussion note, or, if there be great distension with air, the note may be dull and muffled. The breath sounds may be feeble and distant, or there may be amphoric breathing, while the voice sound may by diminished or increased, or pectriloquy may be heard. The metallic echo and the bell sound may be obtained.

The heart may be displaced to the opposite side, and the abdominal viscera displaced downwards, as in pleurisy with effusion, if there be a large quantity of air in the pleural sac.

The only mistakes in diagnosis likely to arise are when large cavities exist at the apex of a lung and can give similar signs, or when the left lung has much contracted and drawn up the

diaphragm and stomach, so that the base of the thorax becomes resonant.

After some days, when fluid appears in the pneumothorax, this part becomes dull on percussion, and a succussion splash may be obtained.

ASTHMA

is a paroxysmal affection, more common in males, and frequently commencing in childhood. An attack usually begins shortly after midnight, when the patient is wakened by increasing dyspnœa, which becomes so severe as to cause him to hold on to a fixed object to increase his respiratory power. The inspirations are short, and the expirations prolonged and wheezing; cough comes on, with expectoration of a slight amount of mucus. The attack lasts some hours, and gradually passes off, frequently to return the next night; sometimes the attack continues with more or less severity for some days, gradually lessening. During an attack the chest is seen to be over-distended and the percussion note is hyper-resonant, while sibili and rhonchi are heard all over.

The diagnosis has to be made from laryngeal obstructions due to paralysis of the abductors, œdema, etc.; but in these the dyspnœa is mainly inspiratory. In chronic bronchitis and emphysema attacks just like the above occur, and the diagnosis is often doubtful, but these attacks occur mainly in the winter.

As attacks of asthma lead to emphysema, it is not easy to say which was the primary condition in some advanced cases.

CHAPTER IV.

THE CIRCULATORY SYSTEM.

Symptoms.

Pain is more frequent in functional than in organic heart affections; it is often localized about the nipple, and is deep-seated in character; it may radiate over the side of the chest to the neck or to the left shoulder, and various degrees down the left arm to the elbow or wrist, chiefly on the inner side.

The pain of pericarditis is over the whole precordium, and accompanied by tenderness.

The pain of angina pectoris is a sudden gnawing, tearing, or constrictive pain in the precordium, often accompanied by pain shooting through into the back, and radiating to the other situations described above.

Abnormal sensations, such as palpitation, oppression, sinking, etc., are observed in cases where the heart is not acting regularly, either from valvular or degenerative change, or from pressure by abdominal distension, especially dilated stomach, constipation, etc., or from pressure by pericardial or pleural effusions or displacement due to lung tumours, contracting cavities, etc., or as a symptom of anæmia, dyspepsia, etc.

Syncope is frequent in heart disease, especially in aortic regurgitation, in aortic aneurism, and in embarrassment of the heart by displacement or pericardial adhesion, pressure, etc. It may occur from the sudden fall of blood-pressure due to removal of pleural or ascitic fluid, etc.

Vertigo occurs in any form of heart disease, owing to variations in the blood-supply of the brain; but it occurs in many other affections, such as anæmia, dyspepsia, brain tumours, ear disease, disseminated sclerosis, etc.

Dyspnœa.—The causes of this have been mentioned before. It is frequently very marked in heart disease, especially in mitral disease or when the muscular tissue is degenerated. In aortic disease it frequently takes the form of a long, sighing respiration taken at a few minutes' interval.

Hæmoptysis in small or large quantities, due to lung congestion or infarcts, is often seen in mitral disease, especially mitral stenosis, and also in the later stages of aortic disease, when the mitral valve has become incompetent.

Orthopnœa is the condition when breathing in the recumbent posture is difficult or impossible; it is seen in advanced heart disease of all kinds, but more especially in mitral valve disease.

Disturbed sleep or sleeplessness is probably due to disturbed cerebral circulation, and is often a very distressing condition in heart diseases.

Cyanosis and clubbing of the fingers and toes is most marked in certain congenital heart defects, and in tricuspid valve disease;

it is also present in mitral disease, while in aortic disease anæmia is usually most marked.

Œdema, beginning in the ankles and gradually spreading upwards, first to the trunk, then involving the peritoneum, causing ascites, and finally the thoracic cavities, is seen in advanced cases of mitral and tricuspid disease, or in any condition of weakness of the cardiac muscle, as fatty heart, or where the action of the heart is hampered, as by pericardial adhesions, etc.

It is greatly assisted by gravity, as is shown by the œdema of any limb, as an arm, which is left long in a dependent posture.

Œdema may also occur in heart disease with very feeble circulation from venous thrombosis.

THE HEART.

The point of maximum impulse of the heart, usually called the apex beat, is normally in the fifth left interspace, about midway between the nipple line and the left edge of the sternum.

The heart, as a whole, extends from the upper border of the third rib to the level of the sixth chondro-sternal articulation, and transversely from a little within the left nipple to a finger's breadth to the right of the sternum.

Looked at from before, almost the whole surface is that of the right side of the heart, while the left auricular appendix comes forward behind the inner part of the third rib cartilage, and from its tip the auriculo-ventricular groove descends to about 1 inch internal to the anatomical apex of the heart.

The projection of the valves on the anterior surface of the chest wall is as follows:

The pulmonary valve lies horizontally at the level of the upper border of the third costo-sternal articulation, half behind the left sternal edge, and half behind and just above the third costal cartilage.

The aortic valve lies horizontally exactly below the preceding, at the level of the lower part of the third costo-sternal articulation, half behind the sternum, and half behind the lower part of the third rib cartilage.

The mitral valve lies nearly horizontally a quarter of an inch lower than the aortic valve and deeper in the chest; its forward

projection lies about the middle of the third interspace, partly behind the sternum, and partly behind the third interspaee.

The trieuspid valve is more superfieial than the mitral; it lies in a direetion slanting downwards from left to right in a line from the left sternal edge at the middle of the third interspace to the fourth right ehondro-sternal artieulation.

Physical Signs.

Bulging of the precordium is speeially frequent in ehildren who are suffering, or have suffered, from perieardial effusion, or who have enlargement of the heart. The interspaees may be noted to be wider than natural.

Cardiac Impulse.—This may not be *visible*, or *only slightly so*, owing to abnormally thick ehest walls, emphysema, perieardial effusion, or weakening of the heart's force, as in late stages of valvular disease or degeneration, frequently fatty, of the heart musele. Sometimes when the heart is mueh displaeed the apex beat may be invisible, and the heart's position only diseoverable by pereussion or auseultation.

The **position** of the impulse may be ehanged in any direetion.

(i.) Downwards from cardiae hypertrophy, ehiefly of the left ventricle, or from being pushed down by aortie aneurisms or mediastinal tumours.

(ii.) To the left from eardiae dilatation, espeeially of the right side of the heart, or the pressure of a right-sided pleuritie effusion or pneumothorax.

(iii.) Upwards from perieardial effusion or adhesions, or the eontraetion of a eavity in the upper part of the left lung, or the pressure upwards of abdominal distension from any eause, sueh as gas, aseites, tumours, peritonitis, ete., and occasionally by hydatids in the liver.

(iv.) To the right from left pleural effusion or pneumothorax, eontraetion of a eavity in the right lung.

Deformity of the thorax may displaee the apex beat in any direetion. The *character* of the impulse is loealized and heaving in hypertrophy, and diffused and slapping in dilatation.

Other Pulsations.—An undulatory impulse in the third, fourth, and fifth interspaees, and often in the seeond and sixth as well, is sometimes seen in perieardial effusion and in cases of

failing of a much-enlarged heart. This impulse appears to travel from above downwards, and sometimes the impulse in the second space may be distinctly presystolic in time, and may be due to the beat of the enlarged left auricle.

In cases of pericardial adhesion the same undulatory impulse may be seen, but then sometimes one or other interspace may distinctly recede with the impulse of the heart; also the upper part of the epigastrium may show a systolic recession, which is said to be diagnostic of pericardial adhesion.

In connection with this, it may be mentioned that a systolic impulse may sometimes be seen in the second or third right interspace, most commonly due to aortic aneurism.

Epigastric pulsation is often seen in dilatation of the right side of the heart. The diagnosis of this cause has to be made from that of pulsating liver, abdominal aneurism, or pulsating aorta, or a tumour transmitting the ordinary aortic pulsation.

A normal-sized heart which is displaced downwards from any cause, as emphysema, may give a pulsation in the epigastrium.

Palpation.—The characters, actual position, and area of the apex beat are well made out by palpation.

The force of the impulse is increased—

1. In cardiac hypertrophy.
2. In excited action of the heart, as in emotion, hysteria, exophthalmic goitre, etc.
3. When the edge of the lung over it is consolidated, or drawn away so as to cover the heart no longer.

The force of the impulse is lessened—

1. By thickness of chest wall, or emphysema of the lung covering it.
2. By pericardial effusion occasionally.
3. By dilatation of the heart.
4. By weakness of heart muscle from fevers or exhausting diseases, or degeneration (fatty or otherwise).

The impulse may be irregular either in time or force; but usually both suffer together. This is greatest in mitral disease, especially stenosis; but pericarditis, pericardial adhesion, or fatty degeneration of the muscle, may cause the same irregularity.

Thrills.—The thrills felt at the apex beat are two—systolic and presystolic.

The systolic is not very common; when present, it usually coexists with an organic mitral systolic murmur, and helps in the diagnosis of mitral regurgitation.

The presystolic thrill is much more common; it is a long, purring thrill, and must not be confounded with a peculiar wavy impulse often felt in nervous women on a first examination. It is generally believed to be due to mitral constriction, and may or may not be accompanied by a presystolic murmur; but in patients who are frequently examined the presystolic murmur is usually heard at some period.

At the base of the heart, in the third or second right interspace, a systolic thrill may sometimes be felt; this may be due to aortic constriction, or to atheroma of the ascending part of the aortic arch, or to an aneurism in this situation.

A diastolic thrill in this part may be due to aortic regurgitation.

Pericardial friction, or fremitus, is occasionally felt in cases of pericarditis before the onset or after the subsidence of the effusion; its rhythm is cardiac; continues while the patient holds his breath; it has a rubbing character; as a rule, does not last beyond a day or two, and may change its situation; the time is often both systolic and diastolic.

Percussion.—1. Light or superficial percussion will map out the superficial cardiac dulness, which is that portion of the heart entirely uncovered by lung. The limits of this absolute dulness are as follows: On the right, the left edge of the sternum; on the left, a line passing downwards and somewhat to the left, about one-third nearer to the nipple than to the left sternal edge; above the fourth costal cartilage; below it merges into the liver dulness, and the difference of note is difficult, and generally impossible, to distinguish.

In health, on a deep inspiration, this area is much lessened; but in some cases of pericarditis, especially when the inflammation has extended to the mediastinum, the encroachment of resonance over the dull area is not to be made out; this is best made out by percussing over the left limit of the superficial dulness during both expiration and inspiration, when the note will be constant in its deficiency, while normally it becomes more resonant on a deep inspiration. A local pleurisy would cause similar phenomena.

Absence of the superficial cardiac dulness is seen in cases of emphysema, and increase of it in pericardial effusion, where the distended pericardial sac displaces the adjacent lung.

2. Deep percussion may map out the deep cardiac dulness, though it is an unreliable guide to the actual size and shape of the heart or pericardium, as this is rounded at the sides and gradually slopes away embedded in resonant lung-tissue.

In health the normal limits of deep cardiac dulness are: Upper limit, the upper border of the fourth rib cartilage, or the lower part of the third intercostal space; right limit, the left sternal edge; the left limit is a line inclining downwards and outwards about half an inch internal to the nipple to a point just outside the apex beat. The lower limit shades into the liver dulness, which is more toneless than the cardiac dulness.

Deep cardiac dulness may be diminished by emphysema or pneumo-pericardium; its position is altered by any cause of displacement of the heart, as enumerated previously.

The dulness is increased—

1. In disease of other organs, atrophy of the lung or consolidation of a part of the lung near the heart, morbid accumulations in the mediastinum or pleura, and in aortic aneurism.

2. In cardiac disease. Hypertrophy increases the dulness to the left and downwards chiefly, but to some extent in all directions; dilatation increases the dulness horizontally both to right and left, the former mostly if the right auricle is especially enlarged, the latter if the ventricle is affected.

Enlargement of the left auricle increases the dulness upwards to some extent.

Pericardial effusion increases the dulness upwards to a marked extent, sometimes as far as the clavicle, and to a less extent it widens the cardiac dulness. It is said that 4 ounces of fluid is the least amount that can be detected clinically. Dulness at the base of the heart, usually mostly on the right side of the sternum, may be caused also by aneurism of the aorta or by mediastinal growths.

Auscultation.—The most important places to listen to the heart's sounds are the apex, the second right and left intercostal spaces near the sternum, over the sternum at the junction of the third ribs, and near the ensiform cartilage. The normal

heart sounds must be carefully studied at all theso points before a beginner should attempt to auscultate a heart which is diseased.

1. *Alterations in the Heart Sounds.—Reduplication of the first sound* of the heart, caused by asynchronism of the beat of the two ventricles, is best heard either at the apex or in a horizontal line from this point to the sternum; it is called 'cantering action,' or 'bruit de galop,' from its resemblance to the sound of a galloping horse. It is heard occasionally in commencing pericarditis, before the onset of a mitral systolic murmur, or taking the place of a presystolic mitral murmur, in some cases of emphysema or of increased peripheral resistance, as cirrhosis of the kidney or atheroma.

Reduplication of the second sound is usually best heard in the third left intercostal space, but sometimes at the apex or all over the precordium, and is due to asynchronism in the closure of the aortic and pulmonary valves; it is usually best marked in cases of mitral stenosis, but is sometimes heard in pericarditis, emphysema, etc. It has been called 'bruit de rappel,' from a resemblance to the rebound of a hammer on an anvil.

2. *Loudness of the Heart Sounds.*—The first sound is often louder in children, anæmic persons, those with thin chest wall, and in dilatation of the heart and nervous conditions, as exophthalmic goitre. It is weaker than natural in people with much chest covering, or emphysema, in some cases of pericardial effusion, and in cardiac hypertrophy; also in cases of cardiac weakness produced by fevers, especially typhoid, or diseases of long continuance, as phthisis or Addison's disease.

The second sound is louder than usual in cases where the blood-pressure is increased from increase of peripheral resistance or other obstruction to the onward blood-flow. The sound is accentuated over the aorta in cases of kidney disease of some standing, or atheroma; it is weakened in dilatation of the left ventricle, in mitral stenosis, also in aortic disease.

Tho pulmonary second sound is intensified by mitral regurgitation, obstructivo lung disease, as omphysema, or when the vessel is uncovered by the lung.

3. *Murmurs.*—These are abnormal sounds produced within the heart by vibrations in the blood contained therein.

Hæmic murmurs are sounds produced by an abnormal state of the blood, occurring in chlorosis or anæmia from any cause. They are systolic in time, and are heard best over the pulmonary artery, and thence conducted up to the left clavicle; sometimes they are heard at the apex, and are limited to this region; sometimes they are heard all over the cardiac area.

Organic murmurs are produced by diseases or abnormalities of the heart or its valves.

1. *Murmurs heard at the Apex of the Heart.*—A systolic murmur is heard at the apex in cases of regurgitation through the mitral valve. This overshadows the first sound of the heart; it is of a blowing character, and is conducted outwards, or outwards and upwards, to the axillæ, and may be heard at the angle of the left scapula; it is sometimes heard inwards as far as the lower part of the sternum, but it gets progressively fainter in this direction. The second sound is generally accentuated, and the amount of this accentuation is to some extent a measure of the amount of regurgitation.

The systolic mitral murmur must not be confounded with a murmur which occasionally is heard, due to the movement of the heart pressing the air out of adjacent lung tissue. This murmur, systolic in time, is heard in inspiration only, and disappears during expiration; it is also very local in character.

A presystolic murmur, running up to the first sound of the heart, is heard in some cases of stenosis of the mitral valve; it is usually harsh or grinding in character, and the first sound is short and sharp, resembling the second sound, which is often faint or absent at the apex, so that it is not infrequently that the murmur is mistaken for the first sound, and the real first sound for the second. This murmur is localized to the apex of the heart, and to an area about the size of the carpiece of a stethoscope above and internal to the apex.

A diastolic murmur heard at the apex of the heart is generally conducted from the aortic valve, but in some cases of mitral stenosis a murmur which is diastolic, and not presystolic, in time may be heard. The characters and area of diffusion of this murmur are similar to the presystolic murmur.

2. *Murmurs heard over the Aortic Orifice.*—A systolic murmur heard over the aortic orifice is usually due to disease

of the aortic valves causing constriction, or to roughening of the wall of the aorta, usually by atheroma; it is also heard in aneurism. The murmur is conducted up to the right clavicle, and sometimes to the arteries of the neck. In some cases of anæmia without aortic disease a systolic murmur is heard in this situation.

A diastolic murmur heard over the aortic orifice is due to incompetence of the aortic valves; it is often soft and blowing, or may have a musical character. It is conducted down the sternum to its apex, and often downwards and to the left as far as the apex. Occasionally it can only be heard at the apex of the sternum. The second sound may be very feeble or wanting over the aorta, and this, conjoined with a diastolic murmur, suggests a serious amount of regurgitation, while the better the second sound is heard, the less probably is the amount of the back-flow.

3. *Murmurs heard at the Tricuspid Orifice.*—A systolic murmur heard over the fifth right costal cartilage, near the sternum, may be due to tricuspid regurgitation; in cases of extreme dilatation of the right side of the heart this murmur may be best heard further to the right than this. It is a fairly localized murmur, and usually gets much fainter the further it is traced; and if a mitral systolic murmur coexist in the case, there is to be found a place between the sternum and the apex where neither murmur is as well heard as in their usual situations. This murmur is usually of rather a harsh and grating character, so differing from that produced at the mitral orifice.

Systolic murmurs in the same situation may also be produced by aneurism of the descending aorta, or by the conduction of a mitral murmur to this spot.

A presystolic murmur heard in same situation as the above has very rarely been heard, and is said to have been due to stenosis of the tricuspid valve; it usually occurred in young women, and was probably of congenital origin.

4. *Murmurs heard over the Pulmonary Artery.*—A systolic murmur in the second left interspace is frequently of hæmic origin; this has been mentioned above. It is heard also in cases where, owing to phthisis or old pleurisy, the vessel has been twisted, and perhaps narrowed or pressed upon by tumours.

It is also heard in some cases of patent foramen ovale, when the pulmonary artery is constricted near where it joins the heart.

A diastolic murmur over the pulmonary artery is said, in some infinitely rare cases in which it has been heard, to be due to regurgitation through the pulmonary valve.

It must not be omitted, however, that both systolic and diastolic murmurs arising from disease of the aorta are sometimes heard louder over the second left interspace than in the usual situation.

5. Other intracardial murmurs are heard in cases of malformation of the heart; they are generally very loud, and frequently heard over the whole precordium, and sometimes at the back. They are usually systolic in time, and the most frequent anatomical cause appears to be non-closure of the foramen ovale.

Extracardial Sounds.—Friction sounds are heard in cases of pericarditis; they are systolic or diastolic, or both; they may be heard at any part of the precordium, but are most usual towards the base of the heart, and are localized. They vary much from hour to hour, and are very superficial in character; they may be rubbing, moist or dry, crackling or creaking, and are often increased in loudness by pressure with the stethoscope.

These sounds may be the earliest sign of pericarditis, and often persist throughout the effusion of a large amount of fluid, in this case being heard usually at the base of the heart.

Sometimes, in cases where there is pleurisy over the cardiac area, the friction sound takes the rhythm of the heart; if there be much friction elsewhere, the diagnosis is easy, but if not it is exceedingly difficult. The points in favour of the friction being pleural are that it is limited to the sides of the precordium, and that it either ceases or becomes much less distinct when the breath is held. Also this kind of friction is sometimes limited to the expiratory period.

Occasionally, in old persons with rigid chest walls, there is to be heard a faint, dry, grating sound over the lower part of the sternum; this may be due to pressure of the bone against the heart, the evidence of which pressure is to be seen in that pericardial thickening known as the 'corn' of the heart.

THE ARTERIES.

The state of the arteries should be examined, chiefly in the radial, brachial, and carotids.

They may be *unduly visible* owing to low tension of blood, as in aortic regurgitation, or to want of tone of the arteries themselves; this last condition is frequent in the so-called pulsating aorta of weakly women, and in the enlargement of the arteries of the neck in cases of exophthalmic goitre.

The arteries may be unduly tortuous, as seen in the temporal, radial, and brachial arteries, which is significant of arterial degeneration.

The artery wall may be harder than natural, so that it can be distinctly rolled under the finger. The radial artery of a healthy adult under thirty years should not be felt when the blood is pressed out of it.

The arteries may be hard from the calcareous degeneration of atheromatous deposit, and this can often be felt as hard masses in the arterial wall.

If an aneurism exist, or have existed, this is diagnostic of degeneration of the arteries, except it has been caused by traumatism.

It must be remembered that, as a rule, atheroma affects the aorta before the peripheral arteries; and so the presence of normal, temporal, or radial arteries does not certify that the aorta is healthy.

THE PULSE.

The following characteristics of the pulse should always be made out. The pulse is usually felt with the three middle fingers, and of these the index should be the nearest to the body:

1. **Frequency.**—The normal pulse frequency is about 72 a minute in the adult in the sitting posture; it is increased by emotion, exercise, or disease, and diminished by rest, especially in the recumbent posture. It is greater in the child, which at birth is often 120 or so; this gradually lessens with age.

In disease, a frequent pulse is met with in exophthalmic goitre and some functional diseases; in all forms of heart disease, especially mitral disease and pericarditis; also in dyspepsia; osteo-arthritis; fevers, especially scarlet fever and

diphthoria; certain poisons, especially tobacco; and brain diseases, as meningitis.

A slow pulse may be congenital; or a sequel of an acute illness, especially typhoid fever, influenza, and diphtheria; or due to some nervous cause, as brain tumours or other cerebral disease, usually by increased intracranial pressure. It sometimes occurs in aortic disease, or in fatty degeneration of the muscle of the heart.

2. **Rhythm.**—Regular, irregular, intermittent. The pulse may be irregular from heart disease, usually mitral disease, more especially stenosis; also in any degeneration of the heart muscle due to granular, fatty, or fibroid changes; or from poisons, such as tobacco or the poisons of uræmia, etc., in the blood; or from reflex nervous causes, as dyspepsia or gout, or centric causes, as meningitis, etc.

The pulse may be intermittent—that is, a beat may be completely dropped occasionally. This has little known significance, and may be habitual to some; it occurs from over-indulgence in tea or tobacco, from gout, and in certain hypochondriacs.

3. **Size.**—The pulse may be large, small, or only just perceptible—'thready' or 'running.'

As a rule, a large pulse means a powerfully-acting left ventricle, with low blood-pressure, and possibly relaxation of the arterial tone; it is best shown in the pulse of aortic regurgitation, but also sometimes during and after acute febrile conditions, after acute hæmorrhage, etc.

A **small pulse** is seen in mitral disease, especially mitral stenosis, in aortic stenosis, pericarditis, degeneration or weakness of the heart muscle, and all asthenic conditions, especially Addison's disease.

The pulse is **thready** from similar conditions to those causing it to be small, and is a sign of excessive cardiac weakness, often heralding the approach of death; it is a marked feature in collapse from any cause.

4. Percussion wave, or ictus, may be very **quick** or **slow**, and gradual in attaining its maximum. A quick pulse is very marked in aortic regurgitation, if it be not combined with mitral regurgitation, also in conditions of relaxed arteries or sudden bleedings; it is therefore seen in acute fevers and debilitating conditions.

The pulse is slow in cases of aortic stenosis, or in an artery beyond an aneurism.

N.B.—The distinction between frequency and infrequency and quickness and slowness must not be lost sight of.

5. The pulse may be sustained or collapsing.

A **sustained pulse** is one in which the artery appears full between the pulse waves; it is a sign of a well-acting heart, with healthy elastic bloodvessels in good tone, and is a sign of high tension of blood. It is abnormally seen in cases of cirrhosis of the kidney, and in other cases of kidney disease.

A **collapsing pulse** is one when the artery appears empty between the beats; this is the case in most cases of aortic regurgitation, and if very marked the pulse feels as if the blood were shot through the artery like a bullet, when it is called **Corrigan's** or the **water-hammer pulse**, from the resemblance to the toy called the water-hammer.

6. The **dichrotic pulse** is a sign of a relaxed tone of the arteries, and is seen at the end of some exhausting diseases—for example, typhoid fever or pneumonia.

7. **Equality of the Pulses.**—The two radial pulses may be unequal in two ways. They may not be synchronous, or one may be smaller than the other. Either or both of these abnormalities is most frequently due to aneurism of the aortic arch, though it is conceivable that local atheroma might have a similar effect.

8. **Tension of the pulses** is judged of by the ease with which the pulse wave may be stopped, and hence not felt by a finger on the peripheral side of the compressing finger.

High tension is a sign of a strongly-acting heart, combined with a resistance to the on-flow of blood in the arterioles; it is specially met with in renal disease.

Low tension is a sign of a weakly-acting heart, or of relaxation of the arteries, or of both combined; it is especially seen in fevers of some duration, as enteric fever, or in long-continued debilitating disease.

The distended jugular veins may pulsate; this is usually due to mitral or tricuspid disease. It should be observed if on emptying them, and preventing the return of blood from above, the veins fill rapidly from below; if this occurs, it is a sign that

the valves between them and the heart are incompetent, which is generally due to obstructive heart disease; and if this reflex filling is accompanied by marked pulsation, it is most probable that tricuspid regurgitation is the cause.

Distension of veins locally means, as a rule, that there is obstruction to the circulation in the parts beneath; for example, a distension of the superficial veins of the cranium is often seen in tubercular meningitis, or hydrocephalus, or in blocking of one of the cerebral sinuses. Distension of the veins of the chest wall is seen when an aneurism or tumour is obstructing the circulation beneath; distension of veins over the abdomen is seen when cirrhosis of the liver or other cause obstructs the passage of blood through the portal vein, and to a very marked extent in the rarer cases of obstruction of the inferior vena cava, when large varicose veins are seen on other side of the abdomen and chest, extending from the groins to the axillæ and clavicles.

Arterial thrills are sometimes to be felt by the fingers over an artery; they may be caused by atheromatous or calcareous roughening of the arterial wall, or by an altered condition of the blood, as in anæmia; in the latter case they may sometimes be felt over the pulmonary artery in the second left intercostal space, in the former case over the carotid or subclavian arteries. They were well marked in the latter situation in a case of a man suffering from angina pectoris, who had extreme arterial degeneration.

THE VEINS.

The veins most easy to examine are the external jugulars. These veins may be distended from any obstruction to the onward flow of blood from heart disease, especially of mitral or tricuspid valves; from obstruction to the circulation through the lungs, as emphysema, lung consolidation (pneumonia or fibroid phthisis or tumour); or from partial or complete obstruction of the superior vena cava or subclavian veins due to pressure of aneurisms, tumours, or enlarged glands, or to partial clotting within the vein. If the superior vena cava be obstructed, there will also be distension of the veins of the head, neck, arms, and upper part of the thorax; with œdema of these parts, and after some days, if the patient lives, distension of veins over the surface of the chest will appear.

THE CAPILLARIES.

In cases of retarded circulation from any cause, a marbled appearance is often seen on the limbs or trunk; this is a local capillary distension.

Capillary pulse is seen chiefly in cases of aortic regurgitation, and may be shown by rubbing the forehead with the back of the finger nail, and then observing the alternate blushing and blanching of the part synchronous with the pulse beats. It may also be seen by gently pressing on a finger-nail, and observing the redness at its root, flowing forwards and ebbing backwards at each heart beat.

Tache Cerebrale. — This is due to a sluggishness of the capillaries owing to vaso-motor disturbance; it is elicited by drawing the edge of the nail over the skin, when a bright red line is produced, which when it lasts for a long period is called the 'tache cerebrale,' and was supposed to be significant of tubercular meningitis; but it is seen in many other conditions, and even in health.

SPECIAL HEART DISEASES.

ANGINA PECTORIS.

This consists in a severe pain in the precordial region, coming on suddenly. There is often a sense of constriction in this region; the pain may radiate upwards to the neck, or down the left arm to the elbow or fingers. With the pain there is collapse and a feeling of impending death. The duration is, as a rule, some seconds up to half an hour. The disease occurs chiefly in persons over middle age who have been the subjects of gout, and whose arteries, as a rule, show evidence of degeneration, and who have frequently disease of the aorta and its valves.

There are no known abnormal physical signs accompanying this condition.

PERICARDITIS.

Symptoms.—In many cases there may be no symptoms; when these occur, they consist of pain in the cardiac region—

which may radiate over the chest, and which is increased by pressure — much dyspnœa, and the patient lies prone in bed, with an expression of pain on the face. Occasionally there is dysphagia. The temperature generally rises several degrees, but its course is not typical. Palpitation, sleeplessness, and delirium are frequent.

Physical Signs.—The first sign is frequently a eantering action of the heart, heard by the stethoscope to be due to reduplication of the first or second sound. Later there is frequently heard a superficial râle, most commonly about the base of the heart or near the left edge of the sternum.

In cases in which there is no effusion the physical signs may be limited to these, but if there be effusion there may be the following signs: Bulging of the precordium, with some flattening of the intercostal spaces, and a wavy impulse seen over this region; the heart's apex beat is displaced upwards, and the impulse frequently weak and irregular. The area of cardiac dulness is increased, especially in the upward direction. The heart sounds are feeble and distant, while a friction sound is frequently not heard, but, if present, is most common at the base of the heart. If there be much effusion, there is often found a patch of dulness, with tubular breathing, in the left interscapular region.

The pulse is frequent, irregular in size and rhythm, and compressible.

ADHERENT PERICARDIUM

is very difficult and uncertain in diagnosis. A clear history of previous pericarditis is of great importanee, and one or more of the following signs may be present. The apex beat may be raised above its natural situation without this being due to traction or pressure from without. There may be considerable retraction of the intercostal spaces near the sternum during the ventricular systole, or a systolic recession of the upper margin of the abdominal wall close to the left costal border.

In the absence of these physical signs, adherent pericardium may be suspected when in a young person, who has no evidence of valvular lesion, there are signs of cardiac dilatation and symptoms indicative of cardiac weakness.

ULCERATIVE ENDOCARDITIS

is a form of pyæmia in which the valves and adjacent walls of the heart are especially attacked; it may occur in the course of acute rheumatism, but often the cause is obscure.

The illness is sometimes acute, with rigors and high fever; sometimes chronic, with few symptoms, except marked cardiac weakness and fever, and even this latter may be absent.

There is usually a murmur at one or more of the usual situations over the precordium, but this may be absent. The disease may begin with rigors and febrile pains. There is much prostration, and the pulse is often small, weak, and irregular. Delirium is frequent. There is often much anæmia. There are two chief types: (1) Pyæmic type, with frequent rigors, followed by a hot and a sweating stage and intermittent pyrexia. (2) Typhoid type, in which the temperature is more continuous; there is early prostration, often delirium or coma. The tongue is dry and the bowels relaxed. In either of these forms the diagnosis is rendered more evident by the occurrence of emboli with acute pain and swelling in the spleen, or pain and hæmaturia if the kidney be affected. Emboli may also occur in the lungs or brain. Purpuric spots may occur on the skin.

The diagnosis is chiefly from typhoid fever and malaria. The presence of a cardiac murmur may assist, as also do evidence of emboli in various organs.

MITRAL DISEASE.

Symptoms.—There are many cases of persons having mitral disease with well-compensated hearts who have no symptoms; but when the compensation ceases to be efficient, some of the following symptoms may arise: Cardiac dyspnœa, or, more properly, apnœa, palpitation, dyspepsia, and sleeplessness; later may arise congestion, with œdema of the lungs, and then congestion of the systemic venous system, causing anasarca, congestion of the abdominal organs, causing dyspepsia, enlargement of the liver and spleen, albuminuria, etc.

Emboli may occur in various organs, causing in the brain hemiplegia, in the kidney hæmaturia, etc. Infarction of the lung is frequent, causing hæmoptysis.

Physical Signs.—The heart's apex beat may be in its normal situation, or if the mitral disease be great, and has existed for some time, the left side of the heart may have enlarged and the apex beat be more to the left than usual, and perhaps slightly lower; also the heart's dulness may be increased to the right, and slightly upwards, this latter increase being most frequent in mitral stenosis.

A thrill may be felt at the apex, usually presystolic in time and helping in the diagnosis of mitral stenosis; or in some cases of mitral regurgitation a systolic apical thrill is to be felt.

On auscultation in cases of mitral regurgitation, a systolic murmur may be heard, which is conducted outwards towards the left axilla and the angle of the scapula, while the second sound is intensified at the apex and at the second left intercostal space.

In mitral stenosis the auscultatory signs may be very varied. There frequently is a presystolic murmur with a short, sharp first sound, while the second sound is not heard at the apex. This presystolic murmur is limited to a small area above and internal to the apex beat. Occasionally no presystolic murmur is heard, but the first or second sound is reduplicated at the apex. At the base the second sound is frequently reduplicated. Occasionally an early diastolic murmur is heard in place of the presystolic murmur.

One characteristic of the auscultatory signs in cases of mitral stenosis is their changeability from day to day.

The pulse of mitral disease as a whole is that it is frequent, small, often irregular, and compressible. This irregularity and smallness is much more marked in cases of mitral stenosis, the pulse in mitral regurgitation being often quite regular. The tension of the pulse is diminished in both kinds, but most markedly in cases of stenosis.

AORTIC DISEASE.

Symptoms. — Aortic stenosis frequently gives but few symptoms, those occurring, if any, being due to arterial anæmia, such as headache, feelings of faintness, etc. Aortic regurgitation frequently causes fainting attacks, feelings of giddiness, attacks of palpitation, occasional dyspnœa, and sighing breathing, etc.

Common to both is angina pectoris, and loss of compensation

of the left side of the heart with regurgitation occurs through the mitral valve, and the case assumes very much the aspect of a case of mitral regurgitation.

Physical Signs.—The heart's apex beat, through hypertrophy of the left ventricle, is frequently carried downwards to the sixth or seventh intercostal space, and as some dilatation is the rule, it is also displaced to the left. The character of the beat is heaving. The cardiac dulness is increased downwards and to the left proportionately to the increase in the size of the left ventricle.

In a case of pure aortic stenosis there is a systolic murmur, heard best in the second right intercostal space close to the sternum, and conducted upwards towards the clavicle and carotid artery.

In aortic regurgitation a diastolic murmur is usually heard in the second right intercostal space near the sternum, and is conducted down the left edge of the sternum or towards the apex beat. In some cases the murmur is best or only heard in the last-named situations. The aortic second sound varies, but is frequently faint or absent.

The pulse of a case of aortic stenosis is generally about normal in frequency, its volume and tension diminished; it is regular, and the rise and fall slow.

The pulse of aortic regurgitation is regular, with a rapid rise, short duration, and sudden fall (water-hammer pulse); it is regular, and of about normal frequency.

When mitral regurgitation is combined with aortic disease, the pulse often becomes irregular, and loses to some extent its water-hammer character.

In aortic regurgitation the pulse is usually visible and the capillary pulse present.

TRICUSPID REGURGITATION.

Symptoms.—Resemble those of mitral disease intensified; there is generally much dyspnœa, cyanosis, and œdema of the legs, and often ascites.

Physical Signs.—There is generally evidence of enlargement of the right side of the heart, producing much visible and palpable

epigastric pulsation, and increase of the deep cardiac dulness to the right of the sternum.

On auscultation there may be a systolic murmur, best heard about the base of the ensiform cartilage or to the right of this, which is not conducted and is not heard far in the direction of the heart's apex.

Other signs of tricuspid regurgitation are enlargement, with a systolic pulsation of the jugular veins, which when emptied fill from below with pulsation. The liver is generally enlarged, and may be felt to pulsate synchronously with the heart. The pulse is usually very frequent, small and irregular.

INTRATHORACIC ANEURISM.

1. Of the Ascending Aortic Arch.

Symptoms.—These may be few or none; if the aortic valves be included in the aneurism, aortic regurgitation and its symptoms may occur. Again, the pressure of the expanding aneurism may cause dull pain from erosion of the rib cartilages.

Physical Signs.—On inspection there may sometimes be seen a systolic pulsation near the sternum, in or about the region of the second intercostal space, and this part of the chest may be bulged into an expansile swelling.

A thrill may possibly be felt by the hand placed upon it. The percussion note is dull, and on auscultation a systolic murmur may be heard. The second sound, when present, is usually accentuated over the aneurism. If the aortic valves be involved, aortic regurgitation may produce its usual physical signs. The aneurism sometimes presses on the superior vena cava, and may produce enlargement of the veins of the neck.

2. Of the Transverse Portion of the Aortic Arch.

Symptoms.—This aneurism is sometimes called 'the aneurism of symptoms,' as physical signs are often few or absent. The symptoms are those of pressure; they are the following: dyspnœa, due to pressure on the trachea or bronchus, or on the recurrent laryngeal nerve; this latter also causes a peculiar

cough and shortness of breath while speaking, so that a breath has to be taken between every few words, and with the laryngoscope will be seen paralysis of the left vocal cord, especially of the abductor of that cord.

Dysphagia may be caused by pressure on the œsophagus. There is as a rule but little pain in the chest.

Physical Signs.—There may be unequal pupils, the left pupil being either contracted or dilated. The pulses may be unequal on the two sides in either rhythm or force. This inequality may be felt in the radial or carotid arteries. There may be slight projection, with indefinite pulsation of the upper part of the sternum, and increase of the area of dulness in this situation. If a bronchus be pressed upon, there may be stridor heard over one lung, usually the left.

3. Of the Descending Portion of the Aortic Arch and of the Descending Aorta.

Symptoms.—These are often very obscure; there may be dull pain localized to the position of the aneurism in the back, or extending round the left side about the costal margin.

Physical Signs.—The aneurism may press on a bronchus or upon lung tissue, causing collapse of the lung or stridulous breath sounds; or on the œsophagus, causing dysphagia. If the aneurism be of large size, it may cause dulness in its situation, or even appear as a tumour with expansile pulsation.

Towards the later stages of all these aneurisms there is frequently much dyspnœa and orthopnœa, with inability to rest except sitting on a chair, leaning forward against some support.

MEDIASTINAL TUMOURS.

Symptoms.—Dyspnœa comes on early, and there is a cough, at first ineffectual, but later with expectoration of mucus, often containing blood so intimately mixed with it as to have the appearance of red-currant jelly. Pain in the chest is frequent, but not severe as a rule, and is referred to various positions. Cachexia is slight as a rule. There is generally no fever. The progress of a case is rapid as a rule, death usually occurring in a little over a year.

Physical Signs. — Are generally marked first behind the sternum, and thence extend to one or other lung. When extending into the lung, they consist in impaired expansion of that side, with often some increase in its measurement. Vocal fremitus is variable, and may be increased or diminished. There is dulness to percussion, and the breath sounds are either faint or bronchial, or sometimes stridulous, and usually there are râles to be heard.

The signs occur usually over a patch of growth which comes near to the surface of the chest, and may be in many different situations, though it is most frequent in the axilla or posterior base of the chest. Signs of pleural effusion are often present, and may mask the signs of the growth, and the fluid is frequently of a brownish tinge, due to altered blood.

Enlarged glands are sometimes to be found in the axillæ or above the clavicles. The superior cava or one innominate vein is often pressed upon, causing œdema and congestion of the head and neck or arm, and an enlargement of the jugular veins and of the veins over the chest.

The heart is frequently much displaced.

CHAPTER V.

DISEASES OF THE ALIMENTARY TRACT.

Symptoms.

Appetite is generally lost in most acute diseases attended by fever, and also in cases of chronic gastric or general disease. It may be excessive in diabetes mellitus, in certain forms of gastritis, and occasionally in children or others suffering from worms. It may be prevented in certain cases of hysteria, etc.

Thirst is a constant symptom of fever; it is also marked in all diseases where the urine is in excess, as diabetes mellitus, diabetes insipidus, and chronic Bright's disease. It is also frequent in chronic gastric catarrh.

Salivation is excessive in many diseases of the mucous membrane of the mouth, also reflexly from gastric or uterine

irritation; or from the administration of certain drugs, especially mercury.

Vomiting is a common symptom of many diseases; it is generally preceded by nausea, except when due to cerebral disease or pregnancy, in both of which cases it frequently has but little relation to food.

The following are the chief causes of vomiting:

1. All diseases of the stomach itself, as catarrh, inflammations, ulcer, carcinoma, etc.
2. As a symptom in certain fevers, as scarlet fever, small-pox, cholera, yellow fever.
3. In diseases of the bowel, as peritonitis, intestinal obstruction, worms, etc.
4. From other reflex irritation, as the vomiting of pregnancy, early phthisis, Addison's disease, biliary and renal colic, etc.
5. Cerebral disease, as cerebral tumour or abscess, meningitis, hydrocephalus, migraine, etc.
6. Poisoning by corrosive and irritant poisons, or over-doses of certain drugs, as salicylates, etc.
7. Certain abnormal blood states, as uræmia, etc.
8. Sea-sickness.
9. Certain vomiting of nervous origin, often called neurotic dyspepsia.

Special characteristics of the vomiting will be mentioned under the various diseases.

Examination of Vomit—*Quantity.*—An excessively large quantity, as 2 or 3 pints, brought up at one time suggests dilatation of the stomach.

Appearance.—Froth may be present from air swallowed with saliva previously; but vomit which is in a fermenting state suggests that the food has remained some time in the stomach, and that probably there is no free hydrochloric acid present, and that the organisms of fermentation, torulæ, sarcinæ, and various bacteria, are present.

Mucus in large quantity shows the presence of catarrh of the mucous membrane of the stomach—a special characteristic of alcoholic dyspepsia. Blood may be present in the vomit in the following varieties: The blood may be fairly bright-coloured and perhaps clotted if in large quantity; this shows it has not

remained in the stomach long, and is characteristic of the hæmatemesis of cirrhosis of the liver and gastric ulcer. The blood may be dark and resemble coffee grounds; this is usually the case in carcinoma of the stomach.

The sediment of vomit which has stood for some time may be examined under the microscope. The following are the chief points to be observed: Torulæ may be present, showing fermentation, and mixed with them are usually some *Sarcinæ ventriculi*,

MICROSCOPICAL EXAMINATION OF THE VOMIT.

a, Striated muscular fibre; *b*, white-blood corpuscles; *c*, epithelium; *d*, starch granules; *e*, fat granules; *f*, *sarcinæ ventriculi*; *g*, fungi; *h*, *i*, cocci and bacilli; *k*, fatty needles; *l*, vegetable tissue.

which are small round organisms, grouped together, as a rule, in fours or multiples of four, and, being thus grouped, are said to resemble a bale of wool compressed by cross-bands. Many other fungi and bacteria also are sometimes seen. These are all specially seen in cases of gastric dilatation. Blood cells or hæmatin crystals are seen in some cases. If the patient have been fed on beef-tea, fragments of muscular fibre may be seen; if these retain their normal appearance and transverse striation,

it shows they have not been acted upon by the acid of the gastric juice, which then is very probably absent.

Flat and cylindrical epithelium, fatty granules, and crystals of fatty acids, mucus, etc., may also be seen in many vomits.

Chemical Examination of Vomit.—1. Litmus paper turned red when dipped in the vomit shows its reaction to be acid.

2. The presence of free acid is shown by Congo-red paper turning blue.

3. If free hydrochloric acid be present, a few drops of an alcoholic solution of tropeolin (1 gramme of tropeolin to 30 c.c. rectified spirit) gives a red colour. Or Gunzberg's solution evaporated with a drop of the vomit gives a rose-red colour at the drying edge. Gunzberg's solution is phloroglucin 2 grammes, vanillin 1 gramme, alcohol 30 c.c.

4. If lactic acid be suspected, 50 c.c. of filtered vomit should be concentrated by evaporation and shaken with 50 c.c. of ether, the ethereal solution evaporated to dryness, and the residue dissolved in water; when a drop of a solution composed of one drop of liquor ferri perchloridi in 10 c.c. of a 5 per cent. acid. carbolic. is added, a yellow colour is produced if lactic acid be present.

Acetic and butyric acids may be distilled from the vomit if present, and when evaporated to dryness give a smell like rancid butter.

The total acidity of vomit may be tested as follows: To 20 c.c. of vomit add three or four drops of a concentrated alcoholic solution of phenolphthalein, and dilute with water to 300 c.c. Put 150 c.c. of this into two flasks, and to one add decinormal sodic hydrate (4 grammes of caustic soda to 1 litre of distilled water) till a pinkish tinge occurs; then the acid is neutralized. From this the total acidity can be estimated; for example, if 50 c.c. of caustic soda solution are necessary to neutralize 100 c.c. of vomit, this equals 0·18 gramme per cent. of hydrochloric acid.

The normal acidity of gastric juice is 2 per 1,000.

The following are the causes of **Hæmatemesis**:

1. Active congestion of the stomach, as corrosive poisoning or other very acute gastritis.

2. Passive congestion of the stomach, from cirrhosis of the liver or obstructive lung or heart disease.

3. Organic diseases of the stomach, as ulcer or cancer.

4. The bursting of an aneurism into the stomach is exceedingly rare.

5. Certain general diseases, as scurvy, purpura, hæmophilia, leuchæmia, yellow fever, etc.

The following are the points most distinctive in diagnosing whether blood come from the lungs or stomach; but it must be remembered that blood coming from the lungs may be swallowed and then vomited:

Hæmoptysis.	*Hæmatemesis.*
Generally a history of cough.	Often previous nausea or indigestion.
Blood is coughed up.	Blood is vomited.
Blood is bright, and often frothy.	Blood often dark or clotted, and not usually frothy.
Blood may be mixed with sputum.	Blood may be mixed with food.
Blood always alkaline.	Blood generally acid.
Sputum is streaked with blood the next day.	No after-expectoration of blood.
No blood passed per rectum, except some has been swallowed.	May be followed by melæna.

Pain after food is more or less marked in cases of dyspepsia from all causes; its seat is the epigastrium and left hypochondrium in cases of chronic gastritis, atonic dyspepsia, neurotic dyspepsia, carcinoma of the stomach, etc., and in these diseases it is usually a dull pain, more or less constant, but increased by food, frequently lasting for hours, and may have only slightly improved by the time the next meal is taken, when it again returns.

The most characteristic gastric pain is that of gastric ulcer; it comes on, as a rule, immediately, or within a quarter of an hour, after a meal, and is of a sharp stabbing character; it is localized to a small area below the ensiform cartilage, and from thence usually appears to pass through the body to another small area by the side of one of the lower dorsal vertebræ. The pain is increased by pressure, and lasts either till the patient vomits, when it soon disappears, or, if vomiting does not occur, it continues an hour or two, disappearing gradually.

Severe pain after food is often complained of by young nervous females, and may be accompanied by vomiting; in these cases there is not necessarily any organic gastric disease, and hence the cases are called by some 'neurotic dyspepsia.' The diagnosis depends on absence of distinctive symptoms of ulcer and the presence of other functional troubles, as aphonia, retention of urine, etc.

It must not be forgotten that pain from other parts than the stomach is frequently referred to the upper part of the abdomen; this is notably so in cases of aneurism of the abdominal aorta, caries of the dorsal vertebræ, pleurisy, etc. Therefore a thorough examination should be made in all doubtful cases to exclude causes such as these.

Pain in the abdomen generally may be universal or localized; in the latter case it is frequently in the umbilical region. This locality of pain and tenderness has no localizing value, but local tenderness in other regions suggests inflammation in the peritoneum beneath, as in the right iliac fossa in cases of typhlitis, over the spleen when this organ is enlarged suddenly, and so the peritoneum is stretched or inflamed, over the liver in cases where the hepatic capsule is diseased, and over the sigmoid flexure where that viscus is inflamed, etc.

General abdominal pain is seen in cases of enteritis, peritonitis, and colic; in the latter case, pain is frequently relieved by pressure, which is not the case when enteritis is present.

Diarrhœa is a frequent symptom, produced by increased intestinal peristalsis, an augmentation in the secretions, or a morbid condition in the mucous membrane of the bowel. It is frequently caused by improper or imperfectly digested food or impure drinking water. It occurs in many acute diseases, notably enteric fever, cholera, dysentery, etc., with toxic doses or long-continued administration of alcohol, arsenic, tartar emetic, and other irritant drugs. It may occur in tubercular ulcerations, amyloid disease, and Bright's disease, or other diseases producing a morbid condition of the blood.

Constipation may be caused by slow or deficient peristalsis of the bowel, or a too early drying up of the fæces, or by intestinal obstruction; in the latter case flatus even is not passed per anum, if the obstruction be complete. Constipation

is marked in anæmia, diabetes, and other conditions causing a loss of tone of the bowel. It is seen frequently in dyspepsia, of which it may be the primary cause, also in many brain diseases; it may be produced by chronic lead poisoning or the opium habit, etc. Constipation is sometimes accompanied by frequent insufficient motions, which consist of only one or two hard scybala; this, if not noted, may be mistaken for diarrhœa.

Examination of the Fæces.—The amount and consistence should be noted. The form may be unnatural; for example, it may be very small in diameter, or compressed laterally, suggesting that it has passed through a narrow passage; this occurs in cancer of the rectum, or pressure on the rectum by a tumour from without.

The colour may be very pale, or even clay-coloured, owing to an absence of bile, seen in cases of jaundice; these stools are often very offensive, and contain undigested fat. The colour may be black, due to administration of iron or bismuth; in these cases the fæces are generally formed and fairly hard. Black liquid motions are frequently due to blood which has come from the stomach, or the small intestine, or upper part of the large intestine; with this there is generally a certain amount of a red colour, enough to certify that blood is passed, but, if necessary, the hæmin test, mentioned under Hæmatemesis, may be used.

Bright blood passed per anum comes usually from internal piles.

The causes of blood in the motions (melæna) are the following:

1. Blood from the stomach, or which has been swallowed, may be passed per rectum.

2. Blood from ulcerations of the intestine, as from typhoid, tubercular, dysenteric, cancerous ulcerations, or from those occurring in Bright's disease, or due to the irritation of hardened fæces.

3. Presence of parasites, notably the *Anchylostomum duodenale*, though the irritation of thread or round worms will in children sometimes produce melæna.

4. Irritant or corrosive poisoning.

5. Blood states, as purpura, scurvy, hæmophilia, etc.

6. Polypi of the rectum, or internal piles.

Green stools are very frequent in a form of infantile diarrhœa; the colour is due to biliverdin, and most probably suggests a septic origin for the diarrhœa.

Shiny stools indicate catarrh of the mucous membrane of the bowel; they are frequent in the chronic diarrhœa of children.

Watery stools are seen chiefly in cases of acute intestinal catarrh, as in dysentery, where they contain some blood, and are compared to the washings of raw meat, and in cholera, where mucus and albumin are present, and the appearance is like that of rice-water.

Pus in a stool is seen in cases of dysenteric, syphilitic, or cavernous ulceration of the bowel, or where an abscess in the abdomen has burst into and discharged by the bowel.

Gall-stones are sometimes found in stools; to be sure of their not escaping notice, the motions should be broken up, and strained through a coarse wire sieve.

Shreds of tissue of the mucous membrane of the bowel may be sometimes recognised in the stool in cases of typhoid or dysentery, and in the latter and some cases of ulcerative colitis membranous casts of the bowel may be passed.

Animal parasites are frequently passed with the stools of infected persons; they are of the kinds described below, the symptoms to which those inhabiting the intestine give rise are ill-defined for the most part, and of very various character. They consist of various gastro-intestinal symptoms as a rule.

Examination of the Abdomen.

The exact position of any local pain should be determined. Most abdominal pain is referred to the umbilicus, but if the pain have another seat, it is probable that the seat of the disease is underneath, though the pain may be referred from disease in another portion of the body; for example, the pain of pleurisy is not unfrequently referred to the abdomen.

The abdomen may be distended from accumulation of flatus or fluid; this distension may be local or general. If local, it may be due to the presence of a tumour or to a local distension of the bowel beneath; for example, if the stomach be distended, there is often bulging above the umbilicus towards the left side,

while distension of the small intestines causes projection chiefly of the lower zone below the umbilicus, and distension of the colon causes bulging in the loins and above the umbilicus.

The umbilicus may be retracted from excessive fat or œdema of the abdominal wall, or flattened or bulged from accumulation of gas or fluid within the abdomen. It may be reddened from local inflammation, as is sometimes seen in tubercular peritonitis.

The skin may show atrophic lines, due to a previous distension of the abdomen.

The superficial veins may be dilated, as they often are, above the umbilicus in cirrhosis of the liver, and in some cases of obstruction of the inferior vena cava there may be large tortuous veins running from the groins to the axillæ.

The respiratory movements of the abdomen may be diminished or absent in acute general peritonitis, or when the diaphragm is paralyzed.

There may be visible pulsation either along the whole line of the aorta, as is seen in the cases of so-called 'pulsating aorta' occurring in certain dyspeptic persons, or there may be a local expansile pulsation, due to an aneurism, or a non-expansile pulsation, caused by a tumour over the aorta. Epigastric pulsations are described under the circulatory system.

The distance of the umbilicus from the pubes and the ensiform cartilage should be noted, as in some cases of ovarian cyst its position is further from the pubes than normal. The usual position of the umbilicus is 1 inch nearer to the pubes than to the ensiform cartilage.

In some cases of chronic intestinal obstruction the coils of distended intestine may be seen as projections of the abdominal wall, and the intestinal movements may be visible.

The abdomen should be palpated, and any abnormality noted. There may be local hardening of the recti, suggesting the presence of disease beneath. The liver, spleen, etc., should be felt for, and any tumour examined.

The more common *abdominal tumours* are :

1. Fæcal accumulation. These are most common in the sigmoid flexure, but may be felt over the whole course of the colon. They are often hard and tender, but movable, and removed after a satisfactory enema.

2. Tumours connected with the liver, which usually appear in the right hypochondrium, are fixed to the liver, and descend with it on inspiration. The most frequent are enlarged gall-bladder, hydatid cyst, and abscess of the liver.

3. Enlarged spleen, the characters of which are mentioned later.

4. Floating kidney, which forms a movable tumour at one side of the abdomen, which presents a characteristic shape, and causes a sickening feeling on pressure.

Tumours of the kidney appear on one or other side of the abdomen, are fixed, and do not move on respiration.

5. Tumours connected with the stomach, the most common of which is carcinoma of the pylorus, may be in any part of the abdomen, but usually are found in its upper part. They are generally small and freely movable, and the characteristic stomach symptoms are present.

6. Aneurism forms an expansile tumour in the middle line, between the umbilicus and the ensiform cartilage; they are fixed, and cause a throbbing pain; they must be distinguished from a tumour which receives a transmitted pulsation from the aorta beneath.

7. Distended bladder forms a fluctuating tumour in the hypogastrium, which disappears on a catheter being passed.

8. Pregnancy forms a greater or less sized tumour, which has begun in the lower part of the abdomen. It is soft and fluctuating, and may have rather the feel of fluid.

9. Ovarian tumour forms a tumour which has begun from below and increased upwards; it is tense and rounded, but may be nodular. It is dull on percussion, but there is usually resonance in the flanks, while the umbilicus is further away from the pubes than usual, and the chief projection of the abdomen is in the lower zone.

10. Fibroid tumour of the uterus may form a palpable tumour springing from the pelvis, in which it is felt to be fixed. It is rounded, but gives no sense of fluctuation on tapping, as an ovarian tumour frequently does.

The diagnosis of ascites is given under the diseases of the liver.

When the abdomen is much distended, certain organs, especially the liver, should be examined by the process known

as 'dipping.' The fingers placed on the abdomen should be rapidly pushed downwards, when the surface of the liver may be felt as a sudden sense of resistance.

Percussion of the abdomen may show dulness in the flanks, which area becomes resonant when the patient is turned on the opposite side. Or the dulness may be below the umbilicus, due to ovarian cyst, distended bladder, or pregnancy, when the flanks will be found resonant.

The dulness of the spleen and liver should be mapped out.

The liver dulness may be entirely absent in cases where there is free gas in the peritoneum, or when the colon is greatly distended.

When free fluid is present in the abdomen, a tap in one loin will cause a wave to be felt by the hand placed against the opposite loin; but, as a precaution, the edge of an assistant's hand should be placed on the upper abdomen, to limit the transmission of a wave along the abdominal wall.

DYSENTERY.

This disease is endemic in certain countries, but in England has only occurred in small epidemics. It begins by slight diarrhœa and colic, after a few days of which malaise and weakness come on, with shivering, and more or less fever; then frequent tenesmus comes on, with much griping pain and frequent passage of motions, containing but little fæces, and chiefly consisting of mucus, stained with blood, or occasional clots of blood, pus, etc. This discharge has been compared to the washings of raw meat. The abdomen becomes distended, and the patient very prostrate and anæmic.

The diagnosis has to be made from enteric fever, or in young persons from intussusception or from cancer of the rectum.

AFFECTIONS OF THE NOSE, THROAT, MOUTH, PHARYNX, AND ŒSOPHAGUS.

Coryza.—The ordinary febrile catarrh is too well known to need description; the usual sources of error are the following:

1. It may be an initial symptom of measles, typhus fever, or small-pox, and the special symptoms of these diseases should be excluded.

2. It may be due to administration of iodide of potash.

3. It may be caused by the presence of nasal polypi.

4. Hay-fever. In this there is intense discharge from the nose, and also from the lachrymal passages, with some conjunctivitis, repeated attacks of sneezing, and after some days much prostration. The disease is very apt to recur during the warmer months of the year.

Ozæna is applied to a condition when the air expired from the nose has an unpleasant odour. The chief causes are the following:

1. Atrophic rhinitis, in which there is a gradual atrophy of the mucous membrane of the nose, and atrophy of the turbinate bones.

2. Caries or necrosis of the nasal bones, usually due to syphilis.

3. Disease of the nasal antrum. In this the patient is conscious of the smell, but others do not often perceive it. There is also, as a rule, a periodic discharge of pus into the nasal cavity.

4. Polypi or malignant growths affecting the nose or extending into it.

Epistaxis, or Bleeding from the Nose.—1. This may occur in purpura, scurvy, hæmophilia, pernicious anæmia, and splenic leuchæmia.

2. It may also occur in cirrhosis of the liver or kidneys.

3. It may be an early symptom of enteric fever, or occur in the course of severe attacks of other acute specifics, as measles, small-pox, ague, etc.

4. It may be due to polypi of the nose, adenoids, or other tumours.

5. It may be produced by certain drugs, notably by salicylate of soda.

Affections of the Mouth.

1. **Aphthæ** begin like raised white spots, soon forming shallow ulcers with a yellow surface and a red border. They occur on the inside of the lips or cheeks, and occasionally on the tongue. They occur chiefly in children.

2. **Ulcerative Stomatitis** attacks chiefly the gums, which become reddened, swollen, and detached from the teeth. Gray

ulcers may form inside the lips and cheeks. The breath is very fœtid, and the tongue large, flabby, and furred. There is much pain, and the teeth may fall out. A very similar condition may follow the administration of mercury.

3. **Thrush** affects any part of the mucous membrane of the mouth, in the form of milk-white spots or patches, consisting of epithelium, with the spores and mycelium of a fungus called the *Oidium albicans*. This affection is common in children, and in adults weakened by chronic illness. A portion of the membrane detached and microscoped will show the characteristic fungus and establish a diagnosis.

4. **Salivation** may occur from the action of mercury or pilocarpine, but sometimes appears to occur reflexly in the course of some abdominal diseases.

The Tongue.—The tongue should be examined in every case, and at least the following points observed:

1. Size: A broad, flabby, teeth-indented tongue is seen in anæmia, and during or after many depressing diseases; it is also frequently seen in atonic dyspepsia. It is sometimes enlarged in cases of stomatitis, and especially in a form of interstitial inflammation known as interstitial glossitis.

The tongue may be atrophied and wrinkled on its surface from disease of the hypoglossal nerves or their nuclei, as is seen in chronic bulbar paralysis. In these cases there is muscular paralysis, and the tongue cannot be protruded if the affection be bilateral, or it is protruded to the unparalyzed side when the disease is unilateral.

2. Tremor of the tongue is seen in alcoholism, in the weakness of some fevers, especially typhoid, and in cases of general paralysis of the insane. Jerky movements of the tongue are frequent in chorea.

3. Colour: In all anæmic conditions the tongue is pale; it is abnormally red in some fevers, especially scarlet fever, in which its papillæ are markedly enlarged, showing through a white fur, and hence called the strawberry tongue. In some cases of gastritis the tongue is abnormally red.

4. Dryness of the tongue is seen in conditions of long-continued or severe pyrexia or in diabetes, where it is clean, red and beefy-looking.

5. A furred tongue is seen in most cases of general febrile disease; it is most marked in cases of acute rheumatism, where it is covered with a thick white fur. In many other fevers the fur is darker in colour. Excessive smoking furs the tongue.

The tongue is often furred from local causes, as enlarged tonsils, bad teeth, or from dyspepsia, constipation, or other diseases of the intestines or disturbances of the liver.

6. Other surface appearances of the tongue are:

(i.) The presence of glazed patches of a whitish colour, looking as if the surface were covered with thin milk; this is called leucoplakia, and sometimes precedes the development of epithelioma.

(ii.) Small irregular ulcers may appear on the tongue, specially at the tip, in persons suffering from phthisis; they have a yellow, uneven surface and an infiltrated edge.

(iii.) Mucous tubercles are occasionally seen on the tongue, but are rare in this situation.

(iv.) Deepish cracks in the tongue are seen in cases of syphilis.

Affections of the Fauces.

1. **Catarrh of the Pharynx**, accompanied by redness, swelling, and slight sore throat, is common in the course of an ordinary febrile cold, or in the course of some acute specifics, notably measles and rubeola.

2. **Ulcerated Sore Throat** causes much constitutional disturbance, and small white superficial ulcers appear on the surface of the tonsils or other part of the fauces. The breath is foul and the tongue furred.

3. **Herpetic eruptions** sometimes occur on the pharynx, and resemble those elsewhere.

4. **Acute Tonsilitis** gives severe pain in the throat and much swelling of the tonsils, with fever. Abscess frequently forms. This must not be mistaken for scarlet fever, where there is usually a rash by the time the patient is seen, and vomiting and excessive rapidity of the pulse are frequent. In some cases the crypts of the tonsils are filled with plugs of muco-pus, which project from their apertures, and the case may resemble diphtheria; but the temperature is usually higher, and the

tonsils more swollen, and the soft palate not so much affected. In a doubtful case a bacteriological examination may be made.

5. **Chronic Tonsilitis** is easily diagnosed by inspecting the enlarged hard tonsils, which never diminish to the normal size.

6. **Granular Pharyngitis** is a chronic inflammation, resulting in dilatation of the vessels of the pharynx and the presence of small prominences on the posterior wall of the pharynx, with often some swelling behind the posterior pillars of the fauces. There is usually some laryngeal catarrh, with cough, and often slight nasal obstruction.

7. **Adenoids** are frequent in children, causing mouth breathing and snoring, by which symptoms they may often be suspected. If the finger be passed behind the soft palate, they may be felt, or can be seen by posterior rhinoscopy. Deafness is also frequent in children suffering from adenoids.

Diseases of the Œsophagus.

Dysphagia, or difficulty of swallowing, may be a symptom of many various diseases. The chief causes are:

1. Nervous, as in hydrophobia, bulbar paralysis, or diphtheritic paralysis, or hysteria.

2. Mechanical: (i.) Within the œsophagus, as from presence of a foreign body, as a fish bone or false teeth. (ii.) In the wall of the œsophagus from carcinoma or fibrous stricture, or the presence of a diverticulum of the œsophagus. (iii.) Causes outside the œsophagus, as in tubercular or œdematous laryngitis, pressure of enlarged glands in the neck or thorax, or of an enlarged thyroid, pressure of an intrathoracic aneurism or tumour, or of a pericardial effusion.

3. To these causes may be added the obstruction due to enlarged tonsils or to a post-pharyngeal abscess, etc.

Stricture of the œsophagus is diagnosed when, after excluding obstruction within or pressure from without, it is found that an œsophageal bougie cannot be passed into the stomach. It is of three kinds: fibrous, malignant, and hysterical. The diagnosis depends on the following points:

In a fibrous stricture there is a frequent history of the swallowing of some corrosive fluid, and then discharge of anything but mucus when a sound is passed.

In a malignant case the patient is frequently old and cachectic; there may be enlarged glands present in the neck, and on passing a sound, if the growth be ulcerated at all, an offensive discharge may be seen upon the instrument, and possibly cancer cells may be recognised by the microscope.

In hysterical or functional stricture the diagnosis has to be made by exclusion. The patient is usually a young female, and on passage of a bougie down to the stricture, and pressing gently but firmly, it may pass through the obstruction, giving to the hand the sensation of muscular resistance.

DYSPEPSIA

means difficulty of digestion, and is usually diagnosed by the patient, owing to the occurrence of pain in the epigastrium, left hypochondrium, or between the shoulder-blades, coming on after a meal, and often accompanied by a sense of distension. It is only occasionally, when headache or palpitation are the chief symptoms, that the patient does not diagnose his malady himself. There are three chief varieties of dyspepsia:

1. **Atonic Dyspepsia** is common in women over middle age, but is also seen in those suffering from anæmia, etc. The characteristic symptoms are pain and distension after meals; the seat of pain is usually under the left breast and round the left side. There is no tenderness; there may be eructations or occasional vomiting. Appetite is bad; the tongue large, flabby, furred, and often teeth-indented; the bowels are constipated.

2. **Chronic Gastritis.**—In these cases there may be a history of alcoholic excess. There is thirst, with a bad taste in the mouth; the tongue is red and raw-looking, with often enlarged papillæ, and lines of brownish fur down the centre; the bowels often alternate between constipation and diarrhœa. There is some pain in the region of the stomach after food, and often slight tenderness; there may be occasional vomiting, or water-brash, or heart-burn.

3. **Neurotic Dyspepsia** is often present in conjunction with other hysterical phenomena in young girls, and has to be diagnosed from gastric ulcer, which it may much simulate. There is often severe pain in the epigastrium and back, but

this pain is often very constant, and may be relieved by food, or if vomiting occur the pain is not relieved, as is the rule in ulcer. There is never hæmatemesis.

GASTRIC ULCER.

This is most common between the ages of twenty and forty, and is much more frequent in females.

It may be latent all through its course, and then is sometimes the cause of sudden collapse through hæmorrhage or perforation.

When it causes symptoms, the most characteristic are the following: sharp stabbing pain coming on within a few minutes of the ingestion of food, localized to a small area of the abdomen, usually just beneath the tip of the ensiform cartilage; this pain frequently goes through the body to another painful spot at the side of one of the lower dorsal vertebræ. If no vomiting occurs, the pain lasts one to three hours; but usually after about half an hour of its onset the patient vomits and the pain is relieved.

The vomit consists of the food, and often contains an excess of hydrochloric acid. Sometimes blood is vomited, which is usually large in amount and clots readily.

The patient is usually anæmic and the bowels constipated; the tongue may be morbidly clean and red, or coated. Occasionally blood is passed by the bowel.

The above symptoms vary intensely in different cases, and a slight chronic dyspepsia may be the only symptom pointing to the presence of a chronic gastric ulcer.

CARCINOMA OF THE STOMACH.

This disease occurs in persons over forty, and is most common in males.

The symptoms vary, as it attacks the pylorus or the body of the stomach; in the former case, after some months of slight symptoms of chronic dyspepsia, the patient notices wasting, and he has more constant pain in the epigastrium, which is increased by food; then he begins to vomit occasionally, generally some hours after a meal. Soon this vomiting becomes more frequent, and often contains much mucus, and is occasionally streaked

with blood. Later signs of dilatation of the stomach come on, and the vomiting occurs less frequently—about two or three times a week; it is then often frothy, of large quantity, often contains dark blood torulæ, sarcinæ, and other micro-organisms, and much lactic and butyric acids, with often a complete absence of free hydrochloric acid. By this time, perhaps, a movable tumour may be felt about the region of the pylorus, and possibly the liver may be enlarged from secondary deposits, while the patient wastes more and more, and may have a marked cachectic appearance.

The diagnosis has to be made chiefly from chronic dyspepsia at first, and later from the other causes of gastric dilatation.

Carcinoma arising in the body of the stomach is still more difficult of diagnosis, partly from the fact that, as it often arises in the scar of a chronic gastric ulcer, the case may be considered to be due to this cause. The age of the patient, the marked wasting and cachexia, may assist, but the symptoms usually resemble those of chronic dyspepsia. The presence of a palpable tumour is suggestive of cancer, but not always conclusive, as the scar of a chronic ulcer of the stomach can sometimes be felt.

PERITONITIS.

Acute General Peritonitis, if showing marked symptoms, begins acutely with great abdominal pain and tenderness. There may be rigors and fever; the pulse is frequent and 'wiry' at first. There is frequent vomiting, never becoming fæcal except there be intestinal obstruction; the bowels are constipated. The aspect of the patient shows collapse, the eyes are sunken and dull, the breathing entirely thoracic, and the thighs are flexed. The tongue is furred, and often dry. After a day or so the abdomen may become distended, and signs of fluid may appear in the flanks. If the cause of the peritonitis be the perforation of some hollow viscus, there may be free gas in the peritoneum, and the liver dulness will be replaced by resonance.

The above are the symptoms of a marked case, but if the peritonitis come on in the course of some acute illness, there are frequently but few indications of its presence, even abdominal pain and tenderness being absent in some of the worst cases.

This peritonitis has to be distinguished from various local forms of peritonitis, as perihepatitis, perisplenitis, etc., and also from typhlitis, in which there may be vomiting, and always constipation; but the tenderness and pain are always confined to the cæcum at first.

It has to be distinguished from colic, the pain of which is very severe but varies in severity much; this pain is also relieved by pressure. The other symptoms are not marked.

When the diagnosis of acute general peritonitis is made, the cause should be determined if possible. The most acute forms are due to rupture of a hollow viscus, as perforation of gastric or typhoid ulcers, or to rupture of the vermiform appendix. The previous history will often decide this question. If there have been previous jaundice and pain about the liver, rupture of the gall-bladder is possible. A patient who has suffered from retention of urine may have ruptured the urinary bladder. Causes connected with the female generative organs are very frequent, and the presence of present or past gonorrhœal or other discharge is very important in women.

Circumscribed Peritonitis gives local pain and tenderness and general symptoms resembling those caused by the acute general peritonitis, but less severe. It is especially frequent in the female pelvis, due to some affection of the generative organs; also in the right iliac fossa, due to appendicitis, and in a more chronic form it occurs round many enlarged livers or spleens. Occasionally also the inflammation caused by rupture of a hollow abdominal viscus remains localized as a limited abscess.

Tubercular Peritonitis leads to loss of flesh and strength with abdominal pains. Diarrhœa is frequent, but constipation may occur; the motions, if much intestinal ulceration be present, may contain pus and blood. Fluid may be present. The abdomen is distended, enlarged veins often present over its surface, occasionally there may be a redness and œdema, or even a purulent umbilical discharge. The abdomen is tender, and here and there an obscure sense of resistance may be felt, due to matted intestine or enlarged glands. On percussion certain parts may be found to be more or less dull. In some cases the diagnosis is rendered certain by the presence of signs of tubercle in the lungs or other part of the body, but occasionally even the

abdominal signs are extremely ill defined, and a correct diagnosis may be impossible.

Cancerous Peritonitis causes an enlargement of the abdomen and frequently ascites, which on tapping is frequently red or brown from presence of blood. There are generally to be felt, scattered irregularly over the abdomen, hard masses of various sizes which are freely movable, showing that they are not in the abdominal wall, though occasionally some form in this situation; they also are not removed by an enema, showing they are not fæcal accumulations. This disease is secondary to cancer elsewhere, most usually in the uterus, ovaries, rectum, or stomach, and symptoms of the primary tumour render the diagnosis more certain.

Simple Chronic Peritonitis comes on slowly and insidiously, often during a long-continued ascites. It causes but few symptoms, but it shortens the mesentery of the small intestine, and glues the coils of intestine to each other, thus producing resistant masses within the abdomen which may be mistaken for malignant tumours. It may also enclose the abdominal fluid in separate loculi, and hence interfere with the usual sign of fluctuation.

TYPHLITIS.

This disease occurs at all ages, but is specially common in children. There is usually a history of constipation, frequently also of previous attacks of abdominal pain with vomiting and constipation. The abdomen is painful and tender, especially in the right iliac fossa, where there may sometimes be felt a resistant mass if the muscles be lax enough to permit of examination. There may also be here dulness on percussion.

There is also constipation, furred tongue, occasional vomiting, and a rise of temperature between 100° and 102° F.; but there is not the collapse of general acute peritonitis, and the pain and tenderness are more localized except a general peritonitis ensues.

INTESTINAL OBSTRUCTION.

Acute Intestinal Obstruction.—Onset is sudden, with a feeling of something having gone wrong in the abdomen, or a feeling of intense pain at one spot; this pain persists. There is

collapse more or less marked. Vomiting sets in, at first of the stomach contents, but after a time of stercoraceous matter. Constipation is absolute, not even wind being passed. The abdomen becomes swollen and tender, and the collapse more marked, the face having a drawn appearance and the eyes being sunken.

The diagnosis must be made from lead colic, typhlitis, and acute peritonitis. The former is recognised by occupation, a history of previous attacks, and by the blue line on the gums. Typhlitis begins by pain in the right iliac region, the constipation is not absolute, the symptoms local, and the vomiting never feculent. Acute peritonitis is distinguished by the acute general tenderness, the peculiar vomiting without effort, which is never fæcal, and that wind, if not fæces, may be passed. The symptoms vary somewhat, according to the cause of the obstruction.

In internal strangulation by bands there may be a history of previous abdominal disease; the onset is very sudden, and there is very severe pain in one spot, early collapse, and the vomit usually rapidly becomes stercoraceous.

In volvulus the symptoms are like the preceding, except that the vomit may not become stercoraceous so early.

In intussusception there is often tenesmus, with passage of bloody mucus per rectum. The patient is usually a child. On examining the abdomen under chloroform, a sausage-shaped tumour may be felt, which hardens under the fingers. The intussusception may protrude from the anus, or be felt by the finger in the rectum.

A hernia should always be looked for in cases of intestinal obstruction.

Chronic Intestinal Obstruction may cause but few symptoms except constipation, and the exhibition of a purgative may simply cause vomiting. There is much tympanites and rumbling of the distended intestines, the coils of which may be seen causing inequalities of the abdominal wall. After a week or two vomiting comes on, and finally death, if the obstruction be not relieved.

The rectum should be examined to ascertain the presence of a malignant growth or fæcal accumulation, and the abdomen for

the detection of malignant growths, matted-together intestine, or intussusception.

PARASITES.

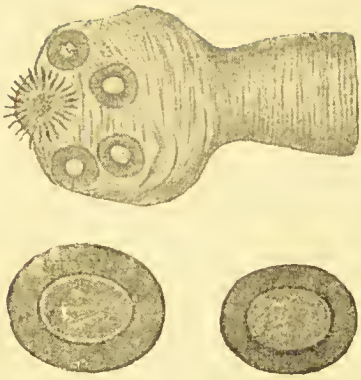
Cestodes or tape-worms consist of a head and neck, to which is attached a series of segments, each bisexual. Those nearest to the head are recent and miniature, but lower down they are larger, and the central branched uterus is filled with ova. Three varieties are best known in this country.

Tænia solium varies from 10 to 20 feet long; the head is about the size of a pin, and has four suckers, in front of which is an anterior projection, the rostrum, which is a group of twenty-six suckers, arranged in a circle; the neck is slender, and begins to be segmented 1 or 2 inches below the head; at first the segments are wider than their length, but they grow especially in length, and gradually become longer than their breadth the further they are from the head, finally measuring about $\frac{1}{2}$ by $\frac{1}{4}$ inch; the uterus runs down the centre of the segment, and has numerous branched projections at the sides, which themselves give off secondary branches. The ova are globular, with a thick radially striated shell. This worm is derived from the pig.

Tænia mediocanellata is larger than the former; the head has four suckers, but neither rostrum nor hooklets. The ripe segments, or proglottides, are about $\frac{3}{4}$ inch long and $\frac{1}{3}$ inch broad; the uterus has more numerous branches than in the *Tænia solium;* the eggs are oval in form. It is derived from the flesh of the cow.

Bothriocephalus latus is derived from fish; it is the largest intestinal worm, often being 20 to 30 feet long. The head is oval, with two longitudinal suckers; the proglottides have a twisted but unbranched uterus, and the generative aperture is in the middle of the ventral aspect of each segment, and not at the side, as in the two former parasites; the eggs are oval, and have a lid, or operculum, which opens to give exit to the embryo.

The other common cestoid worm is the *Tænia echinococcus*, which inhabits the intestinal canal of the dog. In man it forms the common hydatid cyst, which is most common in the liver or peritoneum, but is occasionally found in many other situations.

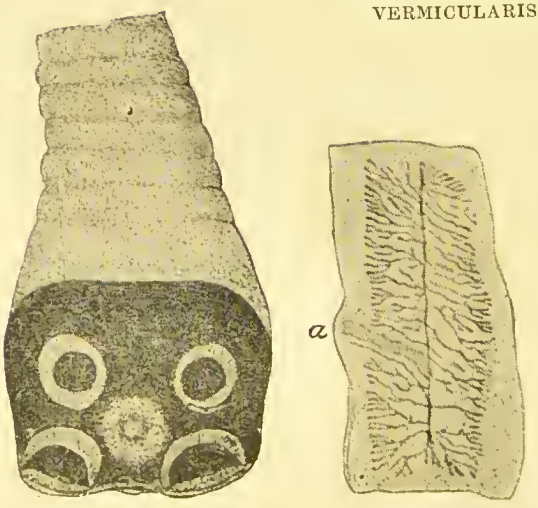


TÆNIA SOLIUM.

PROGLOTTID OF TÆNIA SOLIUM.

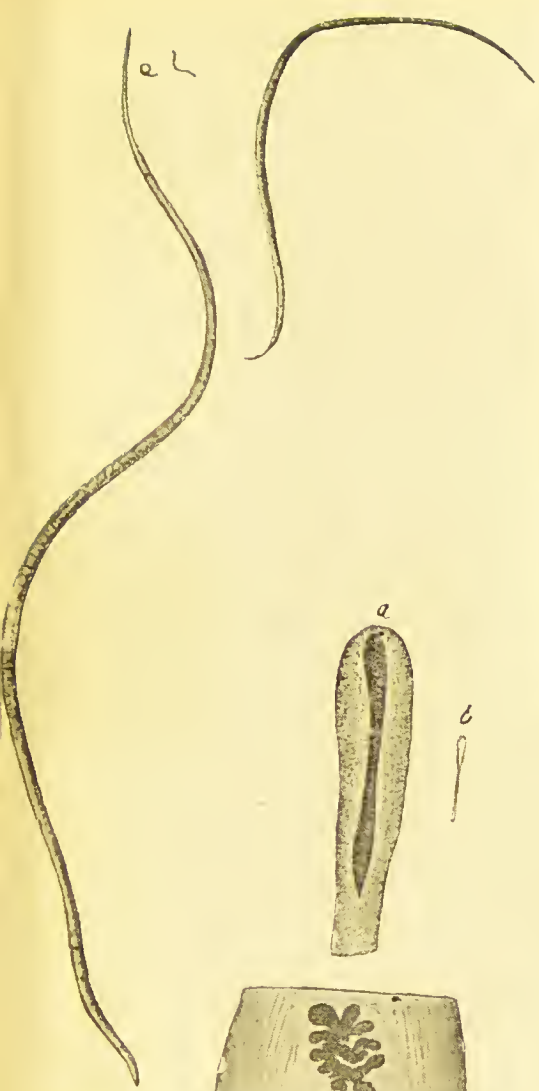
EGG OF OXYURIS VERMICULARIS.

OXYURIS VERMICULARIS.



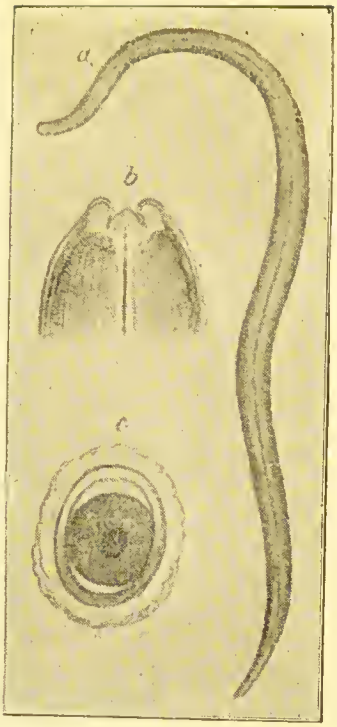
TÆNIA MEDIOCANELLATA.

TRICHINA SPIRALIS.



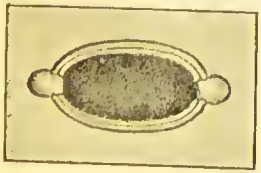
TRICHINA SPIRALIS.

BOTHRIOCEPHALUS LATUS.



ASCARIS LUMBRICOIDES.

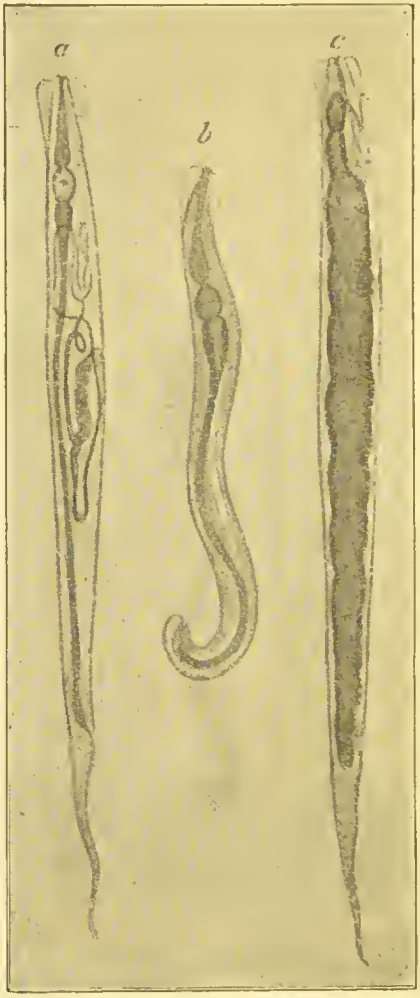
EGG OF BOTHRIOCEPHALUS LATUS.



GG OF TRICHOCEPHALUS DISPAR.

TRICHOCEPHALUS DISPAR.

The peculiarities of this cyst are the following: A slow and probably painless growth, except it rupture or become inflamed. The wall consists of an inner concentrically-striated



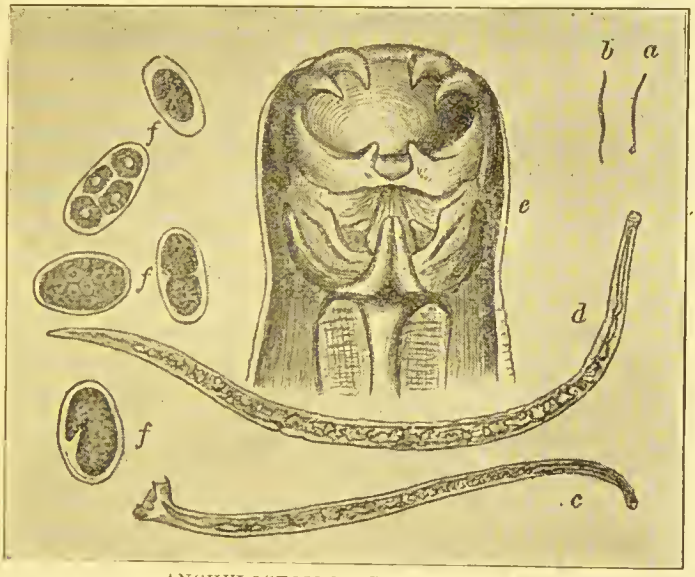
OXYURIS VERMICULARIS (enlarged).

semi-hyaline membrane, and an outer, formed of fibrous tissue of the body of the host. The fluid contains a trace of salts, especially chlorides, but no albumin; the specific gravity is

hardly above that of water, and it is pale, colourless, and transparent. Cestoid heads may be found in it resembling that of *Tænia solium*, or hooklets may be seen, the appearance of which is distinctive.

The Nematodes have long cylindrical bodies, with an alimentary canal; they are unisexual.

Ascaris lumbricoides.—The male is 10 inches and the female 15 inches long; they resemble in appearance an earth-worm. The mouth is provided with three lips; the eggs are slightly oval, and nodulated on the surface. They inhabit the small



ANCHYLOSTOMUM DUODENALUM.

a, *c*, male; *b*, *d*, female; *f*, egg.

intestine, and sometimes migrate to the stomach, for they are occasionally vomited. They chiefly infest children.

Oxyuris vermicularis inhabits the large and small intestine, chiefly in children. The female is about ½ inch long, and the male ¼ inch. It resembles a piece of white thread. The ova are oval, flattened, and smooth on the surface.

These parasites often cause symptoms, among which are vomiting, diarrhœa—the motions may even contain blood—incontinence of urine, nocturnal irritation, etc.

Trichocephalus dispar inhabits the cæcum; it is about 2 inches long, two-thirds of which consist of a long thread-like neck; its ova are spindle-shaped; it causes no symptoms.

Anchylostomum duodenale causes slow intestinal bleeding, and hence anæmia. The male is ½ inch long and the female slightly larger; they have mouths with six teeth, and inhabit the small intestine. The ova are oval, and have a lateral spine on the shell. These parasites inhabit the upper part of the small intestine.

Trichina spiralis rarely appears in the fæces, but as it is a nematode it may be mentioned here. It is a microscopic worm which breeds rapidly in the intestine, liberating ova which migrate to striated muscle and there lodge. The symptoms it causes begin with general malaise for some days, followed by pain in the muscles, especially on movement, and perhaps general œdema. There is fever, about 102° F., the tongue is furred, and the bowels irregular. It may be mistaken for enteric fever, and, if suspected, a minute portion of muscle may be removed by a barbed hook and examined microscopically, when between the muscular fibres will be seen oval bodies with a transparent capsule, within which is seen the minute bent worm. After a time the capsule calcifies, and may become opaque.

Distoma hæmatobium, sometimes called *Bilharzia hæmatobium*, is a trematode worm, and, though inhabiting the veins of the urinary tract, may be mentioned here among the other parasites. The female is ¾ inch long and filiform, the male rather shorter and flattened, but curved laterally, to form a longitudinal ventral groove for sexual purposes. The symptom it causes in Egypt, its habitat, is hæmaturia, and its ova are often discharged with the urine; these have a spine at one end. and contain a ciliated embryo.

The symptoms caused by worms are very various; in children. cough, vomiting, passage of slime or blood by the bowel, picking of the nose, nocturnal irritation, often incontinence of urine, convulsions, etc., are the most usual; in grown-up people they have been said to cause all kinds of symptoms, but these have usually appeared after the patient has become aware of the presence of the parasite, by having passed portions of it in the stools. The diagnosis is made by this history.

CHAPTER VI.

DISEASES OF THE LIVER AND SPLEEN.

THE LIVER.

Symptoms.

The symptoms of liver diseases are: Local pain and tenderness, biliary colic, jaundice, ascites, and perhaps fever.

1. The **local pain** is usually mostly a feeling of weight and heaviness over the hepatic region, and appears to be due to distension or inflammation of the capsule.

The tenderness is present in certain cases seen below.

2. **Biliary colic** begins suddenly and is excruciating, and is referred to the right hypochondrium and scapular region. The patient becomes pale and prostrate, and often shivers; there may be vomiting and hiccough. After a time this acute pain subsides, and is followed by a dull aching till the severe pain returns; this lasts several hours, and finally subsides, leaving the patient weak and exhausted. If the stone have passed into the duodenum, it appears later in the motions, which it is necessary to strain through a wire sieve to find it.

3. **Jaundice** is too well known to need description; it is always best seen in the conjunctivæ, and small degrees may only be visible here. It is sometimes simulated by a deposition of fat beneath the conjunctiva, but on careful inspection the latter is always seen to be irregular in its deposition. When jaundice occurs, the urine contains bile pigment, and the fæces are clay-coloured from its absence; also they are constipated, offensive, and may contain undigested fat.

The **causes of jaundice** are:

(1) Obstructive jaundice, due to:

- Gallstones.
- Catarrh or stricture of duct.
- Pressure on duct from without, due to tumours, especially gummata and malignant growths, or to peritonitic adhesions.

(2) Non-obstructive jaundice, due to:

- Congestion from obstructive heart or lung disease.
- General or portal pyæmia.

Abscess of the liver.
Cirrhosis of the liver.
Acute yellow atrophy.
Poisons in the blood, such as acute specific fevers (especially yellow, relapsing and typhus fevers), constipation, snake-bite, etc.

4. **Ascites** is the accumulation of fluid within the peritoneal cavity.

The abdomen is distended, and with much fluid bulges in the flanks. The skin may be tense and shining, the umbilicus unfolded, and the superficial veins more than usually prominent and enlarged. A thrill may be obtained by striking one flank with the fingers, and felt by the hand placed on the opposite side of the abdomen. To avoid conduction of the vibration through a fat abdominal wall, an assistant should place the hand sideways upon the anterior surface of the abdomen.

The percussion note in the flanks will be dull when the patient lies on the back, but on turning on the side the uppermost flank, which was previously dull, will become resonant. The front of the abdomen is usually resonant, but in old cases of long-continued ascites the mesentery may have shortened to such an extent as to draw back the intestines to the posterior abdominal wall, and the whole abdomen may then be dull.

Ascites has to be distinguished from—

(1) Distended bladder. A catheter will decide this.

(2) Cystic ovarian disease. Here the flanks will be resonant, and dulness be principally over the front of the abdomen; also the history may be that the swelling rose out of the pelvis. The fluid is viscid and greenish in colour.

(3) Pregnancy may be distinguished by the history, the state of the breasts, os uteri, etc.

(4) Hydronephrosis is generally a one-sided tumour, and the ascitic thrill may be absent.

(5) Hydatid cyst of the peritoneum, as a rule, does not give the characteristic dulness and fluctuation of ascites, and the character of the fluid in containing no albumin, and perhaps containing hooklets or small cysts, is distinctive.

(6) Cancer of the peritoneum often produces ascites, and then the fluid is usually blood-stained and contains cancer cells; but the

colloid cancer may resemble ascites in every respect, except that fluctuation cannot be obtained. This disease, however, is very rare.

The fluid of ascites is usually straw yellow, and on standing occasionally shows threads of fibrin; on boiling it becomes solid from the presence of albumins.

The causes of ascites are due to interference with return of blood from the portal vein. The chief are:

(1) Cirrhosis of the liver.
(2) Malignant growth of the liver.
(3) Gumma of the liver.
(4) Perihepatitis.
(5) Thrombosis of the portal vein.
(6) Disease of heart or lung causing obstruction.
(7) Chronic peritonitis (simple, malignant or tubercular).

5. **Fever.**—This may occur to a slight extent in almost any disease of the liver, but is most marked in the suppurative diseases, such as pylephlebitis, multiple abscesses, tropical abscess, or a suppurating hydatid cyst. In these the temperature may assume a remittent form—in fact, it may be that of pyæmia—and the characteristic rigors and sweating may be present. It may or may not appear in cases of acute yellow atrophy.

Examination of the Liver.

The examination of the liver is made to ascertain the size, consistency, regularity, tenderness, and surface.

The extent upwards of the liver is shown by percussion. Commencing above from the lung, there may be traced round the side of the chest a line where the note begins to be impaired, and about an inch below this the note becomes dull.

This upper line of liver dulness normally extends from the tenth rib in the scapular line to the eighth rib in the mid-axilla, thence to the sixth rib in the mammary line, and thence towards the base of the ensiform cartilage. The lower edge extends from the left of the middle line at about the middle of the cartilage of the sixth rib to halfway between the base of the ensiform cartilage and the navel, then to the costal margin in the right nipple line, and on to the tenth rib in the mid-axilla, and to the eleventh rib in the line of the right scapula.

The percussion of the lower limit of an enlarged liver may not

be made out, owing to the overlapping of the colon; hence the lower edge is best made out by palpation.

If there be much fluid in the abdomen, the liver may be examined by 'dipping'; in this method the tips of the fingers are placed on the skin of the upper part of the abdomen and suddenly pressed into the surface, when the liver, if enlarged, may be felt, giving a sensation of solid matter.

In making the diagnosis of an enlarged liver, the left lobe should always be examined for, as sometimes the liver is rotated on an antero-posterior axis, giving the impression of enlargement of the right lobe, if this be the case, of course the left lobe is absent from its usual position.

The surface of the liver should be examined, as in cases of carcinomatous growths or gummata nodules may sometimes be felt on the liver surface.

The gall-bladder, when distended, may sometimes be felt as a rounded tumour attached to the liver, and consequently descending on inspiration. This sign may also occur with a cyst in the liver substance, or projecting from it, or in the case of a pyloric tumour adherent to the liver.

Enlargements of the liver are as follows:

	Tender.	*Other Peculiarities.*	*Jaundice.*
1. *Regular:*			
Congested	sometimes	...	slight
Fatty	...	very soft, almost impalpable	
Amyloid	...	...	
Cirrhosis (sometimes) ...	not often	hard, may be irregular	slight
Obstruction of hepatic or common bile-duct ...	...	...	intense
2. *Irregular:*			
Carcinoma	tender	often irregular	intense
Syphilis	sometimes	may be irregular	frequent
Hydatid cyst	...	may be a tumour	
Abscess	tender	may be a tumour	some

Besides these, there is often enlargement of the liver in rickety children, and in women who tight lace the lower edge may be distorted, and so appear lower than usual.

A **Hydatid Cyst or Abscess** in the liver may not be very palpable from below, but may project into the thorax, giving signs which may be mistaken for those of pleural effusion on the right side; but the dulness is usually higher, about the scapular line, while in most cases of pleural effusion the fluid is at its highest level in the axilla.

Sometimes, again, either of these enlargements may displace the heart, so that the apex is higher and more to the left than usual.

The liver is smaller than usual in two conditions only—atrophic cirrhosis and acute yellow atrophy.

In the former of these cases, owing to the ascites, it is very difficult to ascertain its size, and in acute yellow atrophy it is generally so soft that it tends to fall back towards the back of the abdomen, and may give the impression of being smaller than it is.

CIRRHOSIS OF THE LIVER.

Symptoms.—In the early stage the symptoms are often latent, but frequently there are some symptoms, as morning retching, etc., indicative of alcoholism; there may be occasional attacks of epistaxis or a tendency to piles. In some cases an attack of hæmatemesis may be the first marked symptom. Later, ascites may come on, with slight jaundice; this may fluctuate in amount for a considerable time, but rarely disappears. The patient gets weaker, till death occurs generally from diarrhœa and exhaustion.

Physical Signs.—In the early stages the liver may be found to be regularly enlarged and tender; later on it may contract and become smaller than natural, or it may continue to be enlarged. Sometimes the surface is found to be covered with small projections—'hob-nailed.' It is generally hard, and its edge may be rounded. There is generally much ascites, and occasionally anasarca; the urine may contain albumin. There is some emaciation towards the end. The face is often congested,

with enlargement of the superficial veins on the nose and cheeks —'venous stigmata.'

CARCINOMA OF THE LIVER.

Symptoms.—At first usually latent or slight. There may be slight hepatic tenderness, general wasting, etc., and the alcoholic dyspepsia mentioned under cirrhosis may be absent. The first symptom may be either jaundice or swelling of the abdomen. The patient emaciates, and the symptoms steadily progress.

Physical Signs.—Jaundice may be very marked, as may be the emaciation. The abdominal swelling may be found to be due to fluid, which occasionally is brownish from altered blood. There may be in the abdomen evidences of malignant growths in other parts, notably the gall-bladder, pancreas, and sigmoid flexure. The rectum should be examined, as a primary growth may perhaps be found there. In women the vagina, uterus, and ovaries should be examined for the same reason. The liver is enlarged, and on its surface, perhaps, there may be felt the projecting nodules of malignant growth, which sometimes have a central depressed part. The edge may be very irregular.

SYPHILIS OF THE LIVER.

In this condition there is often a mixture of fibrosis with the presence of gummata, and the evidences may be very varied. Jaundice may be intense, and may occur with or without ascites. The liver may be enlarged, often in an irregular way; its surface may be irregular, and it is often hard. This liver is often tender from perihepatitis.

The history of a previous syphilis must be sought for, and other evidences of syphilis, such as scars of chancre or of skin eruptions, nodes, old iritis, etc.

HYDATID OF THE LIVER.

The symptoms are obscure; occasionally there may be slight pain, but frequently a lump is the first indication of the disease, only discovered on examination.

The physical signs depend upon the part of the liver affected.

If this be the diaphragmatic surface, signs like pleural effusion may be discovered, and the heart may be pushed upwards. If the lower part be affected, a rounded swelling may be felt, resembling the distended gall-bladder. Puncture of the swelling will clear up the diagnosis, as a hydatid cyst contains a clear fluid of low specific gravity, containing no albumin. Small cysts may be drawn off, or hooklets, the presence of either of which is distinctive.

ABSCESS OF THE LIVER.

Symptoms.—May be very obscure; there may be dyspepsia, and occasional dull pain in the hepatic region, and there may be occasional rigors, with rise of temperature, or a continuous, very slight rise of temperature; but sometimes the disease is quite latent till it may burst into the pleura or lung, and the patient coughs up blood-stained pus, or into the peritoneum, when symptoms of acute peritonitis appear, or it may point externally. There may be a history of previous dysentery, and the patient has usually resided at some period of life in the tropics.

Physical Signs.—There may be signs of liver enlargement precisely like those of hydatid cyst, but usually there is some jaundice, often a cachectic tinge of skin, rigors, and fever, which latter may vary much between the morning and the evening. The liver is generally tender, and the patient cannot lie on the right side. Puncture and the extraction of pus will, of course, make the diagnosis certain.

LARDACEOUS DISEASE OF THE LIVER

is diagnosed by recognition of the presence of a cause, such as syphilis, prolonged suppuration, or phthisis. The liver is enlarged regularly and painlessly; there is generally enlargement of the spleen and some albuminuria, while jaundice, ascites, etc., are absent.

FATTY LIVER

occurs chiefly in phthisis or over-feeding; it is enlarged and painless, and there are no symptoms. This liver is very soft and difficult to feel as a rule, as it may fall somewhat back from the anterior abdominal wall.

GALL-STONES.

These may cause no symptoms, but if obstructed in the common duct biliary colic is caused. This is described above. Jaundice succeeds.

The diagnosis is made chiefly by the pain and succeeding jaundice. The liver and gall-bladder may be enlarged, especially if the stone remain impacted. There is frequently a history of a similar previous attack.

SIMPLE JAUNDICE

is diagnosed by a history of duodenal catarrh, such as an attack of indigestion, with perhaps vomiting and diarrhœa, to which jaundice follows. There is little or no pain, and causes of jaundice apart from the liver are absent. As a rule, the patient feels fairly well, and there are no other hepatic symptoms, though the liver may be slightly enlarged.

ACUTE YELLOW ATROPHY OF THE LIVER, OR MALIGNANT JAUNDICE.

The diagnosis of this disease is very difficult, the patient, nearly always a woman, often appearing to suffer from an attack of simple jaundice. At this time the liver is frequently enlarged, and there is some epigastric pain, and perhaps vomiting; then delirium or stupor comes on, the temperature rises, and there may be hæmorrhages from the nose, vagina, or rectum. By this time the liver appears to become rapidly smaller, and its dulness may finally disappear. The urine at this stage often contains leucin and tyrosin, while the percentage of urea is much diminished, and occasionally there is albuminuria. The leucin and tyrosin may be found as a crystalline deposit in the urine, especially if this be concentrated by evaporation. Tyrosin forms bundles of needle-shaped crystals, while leucin forms striated globular masses.

THE SPLEEN.

The spleen normally lies close to the diaphragm beneath the ninth, tenth and eleventh ribs, and with its long diameter parallel

to these, and below the posterior axillary fold; hence, if of normal size it is not palpable.

It may be percussed out by light strokes, and its size indicated if the patient be not stout. This is best done by percussing from above downwards at right angles to the ribs till the note becomes impaired; this gives its upper limit. Similarly, percussion towards the dull area from other directions will give an idea of its size.

If enlarged, the edge is frequently felt below the ribs, and may extend even as far as the iliac crest.

The diagnostic characters of an enlarged spleen are as follows: It is a tumour extending downwards from the left hypochondrium, which moves with respiration, and a notch may be felt in its anterior edge, while the posterior edge does not extend far into the flank, and may be felt; and the fingers cannot be pushed in between it and the costal margin. It is dull on percussion.

It may be mistaken for a kidney, but the differences will be seen below.

The causes of an enlarged spleen are:

1. Fevers, especially enteric, malarial and relapsing fevers.
2. Passive congestion from obstructive heart or lung disease, or cirrhosis of the liver.
3. New growths, as Hodgkin's disease, tuberculosis, malignant growths, etc.
4. Lardaceous degeneration.
5. Infarcts.
6. Certain general diseases, as syphilis, rickets, leuchæmia and splenic anæmia.

LEUCOCYTHÆMIA, OR LEUCHÆMIA,

is most common in males from fifteen to thirty years of age. The course is slow, with increasing pallor and breathlessness. The spleen is much increased in size, and hard to the touch; sometimes lymphatic glands may be affected. There is often irregular fever up to about 102°, and hæmorrhages, including retinal hæmorrhages, may occur.

The diagnosis is made by the examination of the blood, when the white corpuscles will be found to be greatly increased and

very irregular in size and shape. The limit of leuchæmia has been fixed at one white corpusele to twenty red corpuscles.

LYMPHADENOMA, OR HODGKIN'S DISEASE.

This disease is also most common in males, affecting children and young adults. There is increasing anæmia, due to a diminution in number of the red corpuseles, but the white corpuseles are only slightly increased.

There is a hard enlargement of one or more groups of glands, which slowly increase in size without pain or tenderness, and which, as a rule, are quite detached from each other, so that they can be moved freely on each other. They do not tend to break down or to become attached to the skin. The spleen and liver may be enlarged, but only moderately.

The diagnosis has often to be made from syphilitic or tubercular enlargement of the glands.

SPLENIC ANÆMIA

is a disease of infants and young children, characterized by increasing anæmia and progressive enlargement of the spleen, the size of which may become enormous.

The blood does not show any marked excess of leucocytes, and upon this the diagnosis is made.

CHAPTER VII.

DISEASES OF THE URINARY SYSTEM.

Symptoms.

1. **Lumbar Pain.**—This is usually of an aching character, and is often much increased by stooping (simulating lumbago). It is generally most marked in cases of stone in the pelvis of the kidney, when it is often increased after a railway journey or other jolting. It is seen in pyelitis from other causes, in Bright's disease, and in movable kidney. It is often accompanied by tenderness.

2. **Referred Pain.**—In many cases of irritation of the kidney or pelvis by gravel, stone, tubercle, etc., there is a fairly constant

pain felt down the inside of the thigh, or over the fore part of the iliac crest, or in the scrotum. This is evidently a pain referred to the extremity of the ilio-hypogastric or ilio-inguinal nerve.

3. **Renal Colic.**—This is an acute, agonizing pain, often referred down one loin in the direction of the ureter and down the inside of the thigh, or to the testicle, which may be retracted. Occasionally it is also referred upwards into the chest or shoulder-blade, but not so commonly. This is due to a foreign body in the ureter, most commonly a stone from the kidney, occasionally a clot of blood, or a detached fragment of a malignant growth from the same situation. This pain is very severe, and is often accompanied by collapse and vomiting, or faintness. The knees are often drawn up. It is distinguished from biliary colic by the different situation of the pain and by the absence of a subsequent jaundice.

4. **Frequency of micturition** is present in acute Bright's disease, in cystitis, pyelitis, and urethritis, also in cases where the kidney is irritated by stone or gravel, and where the amount of urine is in excess, especially in diabetes and that form of polyuria called diabetes insipidus, and where an excess of fluid is ingested. It is also produced by certain drugs, especially turpentine and cantharides and alcohol, and by some conditions, as hysteria, etc.

Pain before micturition is present in some cases of cystitis and urethritis.

5. **Dropsy** in renal disease is general, though, owing to the absence of fat about those parts, it is generally first noticed in the eyelids and the penis and scrotum; later on pitting on pressure may be noticed all over the body. This has to be distinguished first from the dropsy of cardiac disease, which is first noticed in the lower extremities, though it may affect the arms of a patient who is lying propped up in bed. Secondly it must be distinguished from the hard œdema of myxœdema, which does not pit on pressure.

6. **Uræmia**—A. *Acute Uræmia.*—(1) Convulsions: These are universal, and, as a rule, resemble those of epilepsy. They are usually preceded by headache, drowsiness, or nausea and vomiting. Sometimes one paroxysm succeeds another with hardly an appreciable interval, and a condition like the 'status epilepticus' occurs.

(2) Coma: This may occur with or without convulsions, and much resembles that produced by apoplexy. The presence of œdema and much albuminuria help in the diagnosis.

(3) Delirium, tremors, temporary amaurosis, tonic spasm of the jaw or of a limb, are less frequently seen.

B. *Chronic Uræmia.*—Headache, dizziness and drowsiness, occasional paroxysms of dyspnœa, like those of asthma, itching of the skin, vomiting and diarrhœa, or occasional severe hiccough, are the chief symptoms.

7. **Albuminuric Retinitis.**—This consists of two features, whitish patches and hæmorrhages, which may be combined or occur separately.

The whitish patches occur chiefly round the macula, and often conceal the retinal vessels; they are of raised shapes, and have sharply-defined edges.

Hæmorrhages are often scanty; they are oblong in shape, as a rule, running in the direction of the nerve fibres of the retina.

Optic neuritis is also frequent, and the vessels of the retina have usually thickened walls.

8. The **pulse** of kidney disease is usually of high tension, and the heart, especially in the chronic forms, shows signs of hypertrophy.

9. **Hæmorrhages** may occur in the course of Bright's disease, especially when the disease is chronic; these may occur from the stomach, bowel, uterus, nasal fossæ, or into the brain or under the skin; and in otherwise obscure cases of melæna it is important to remember that this may be due to chronic renal disease.

The Urine.

The normal amount of urine is about 3 pints a day, but it is dependent upon the amount of fluid ingested.

The urine is increased in quantity in diabetes insipidus, in some nervous disorders, as hysteria, in diabetes mellitus, and in chronic Bright's disease, especially cirrhosis of the kidney; also to some extent when dropsies are reabsorbing, and in some kinds of watery conditions of the blood.

The urine is diminished in quantity by excessive sweating, during the formation of pleural or peritoneal exudations, in

Asiatic cholera or cases of excessive diarrhœa, during diminished blood-flow, owing to cardiac weakness, in acute and subacute inflammations of the kidney, and from certain nervous causes, as in some abdominal operations.

The urine is suppressed in very severe cases of Bright's disease, as from scarlet fever or diphtheria, in cholera and yellow fever, and in some cases of shock; also in poisoning by turpentine or mineral acids. These are examples of non-obstructive suppression, and if the urinary flow be not resumed within about thirty-six hours the patient dies.

Obstructive suppression is usually due to the blocking of a ureter in a person who has only one acting kidney, usually by a calculus; in these cases the patient dies in about ten or eleven days if the obstruction be not removed.

Colour of the Urine.—It is pale in diabetes insipidus or mellitus, cirrhosis of the kidney, and in all cases of polyuria.

Urine containing *bile* is of a brownish colour, but transparent, often with a greenish fluorescence. The bile pigment is shown by adding fuming nitric acid to the urine in a test-tube or on a porcelain plate, when at the junction will appear a play of colours—violet, green, red, and yellow; or, on adding liquor iodi to some of the urine in a test-tube, a green ring will appear at the junction of the two liquids (Gmelin's test).

The bile acids may be found by adding some sugar to the urine, dissolving, and placing a few drops on a porcelain slab near a drop of strong sulphuric acid. At the point of junction a violet colour will appear (Pettenkofer's test).

Urine containing excess of *indican* has a bluish-black tint, and on the surface, on standing, may appear a bluish film; it is seen in cases of severe constipation from any cause.

The test for indican is to add an equal quantity of hydrochloric acid to the urine, and then a concentrated solution of chloride of lime drop by drop, and shake, when the colour becomes bluish. On shaking with ether this indigo will form a separate layer.

Excess of urobilin in the urine colours it reddish or brown-red; it is seen in fevers, in liver affections, and alcoholism. On adding to the urine excess of ammonia, it becomes green; filter and add zinc chloride solution, when a red-green fluorescence will appear if urobilin be in much excess.

Carboluria occurs when too much carbolic acid or salol is used internally or in surgical treatment; the urine has a greenish-black colour, getting darker on exposure to the air, from the formation of hydrochinon.

Addition of a drop of ferric chloride gives a violet colour to the urine.

Gallic acid gives a dark hue to the urine, which becomes black on addition of ferric chloride.

Rhubarb gives a gamboge yellow, coloured red by ammonia; senna gives a brown, and logwood a red, colour to the urine.

Blood intimately mixed with the urine comes usually from the kidney or pelvis. If in large quantity, the urine looks bright red, but in less quantity it renders the usually transparent urine semi-opaque, the so-called 'smoky urine.' If the blood be passed in the form of hæmatin, the urine has a browner tint, and deposits brown crystals of hæmatin of a rhombic shape.

The tests for blood are:

1. Add a few drops of tincture of guaiacum to some urine in a test-tube, and then pour on the surface some ozonic ether. This will become blue at the juncture of the two liquids.

2. The microscopic examination of the sediment reveals blood corpuscles; these are often crenated or show protrusions of their protoplasm, and may have lost their biconcave form; still, they are usually recognisable. This is far the best test for blood, and urine should never be certified to be free from blood till it has been microscoped.

Blood from the kidney may occur—

1. In acute specifics, as yellow fever or malaria, etc.
2. In purpura or scurvy.
3. In certain poisons, especially turpentine and cantharides.
4. In acute and chronic hæmorrhagic nephritis.
5. Parasites, as *Bilharzia hæmatobia.*
6. New growths, as cancer or tubercle.
7. Stone in kidney.
8. Infarcts in kidney.
9. Congestion of kidney.
10. Injury.

Blood may come from the pelvis or ureter in—

Malignant growth.

Tubercle.

Stone.

Blood from the bladder is due to—

New growths, as the villous tumour.

Stone.

Foreign body from without.

Blood from the urethra is due to inflammation, as in acute gonorrhœa, or to injury.

Blood from the kidney or ureter is intimately mixed with the urine, but blood from the bladder often appears with the last part of the urine passed; while blood from the urethra may precede the stream of urine.

The normal **odour** of the urine is lost in all cases where it is very dilute, as in diabetes mellitus, excessive drinking, or diabetes insipidus. It is excessive when the urine is concentrated, as in fevers, and when the solid constituents are increased from other causes.

Certain foods, as asparagus, or drugs, as copaiba, give distinctive odour to urine. A fæcal smell may be noticed when fæces are mingled with the urine, as in cases of communication between the intestine and bladder.

Reaction of the urine is acid except after meals, when it may become alkaline.

The urine becomes abnormally neutral or alkaline—

1. By mixture with much blood or pus.

2. By alkaline decomposition in the bladder, due to cystitis.

3. During the absorption of dropsical exudations within the body.

4. It is said to be often alkaline in stomach diseases, such as gastric ulcer, where through vomiting there is a loss of acid to the body.

The specific gravity of the urine varies normally from 1015 to 1025. It indicates roughly the amount of solids. If the two last figures of the specific gravity be multiplied by 0·22, the result will give the percentage of solids in the urine.

The urine has a high specific gravity in diabetes mellitus, and

is generally above the normal in febrile states and other causes of concentrated urine.

The specific gravity is low in cirrhosis of the kidney, diabetes insipidus, and from excess in drinking, etc.

The **odour** of normal urine is distinctive, but is altered by disease. The urine decomposing in the bladder by cystitis, or in the air by long standing, is ammoniacal. The urine of diabetes mellitus has lost the distinctive smell, and has a sweetish odour something like apples; this is due to **acetone**, which gives a red colour with perchloride of iron. Urine mixed with fæces has a fæcal odour and deposits fæcal débris.

Certain foods and medicines give an odour to urine, viz., asparagus, turpentine, cubebs, copaiba, etc.

Urinary sediments are of two kinds: organized and unorganized.

1. **Unorganized Sediments.** — Of these uric acid, urates, oxalate of lime, cystine, xanthine, leucin and tyrosin, may deposit in acid urine.

Urate of ammonium, phosphates, and carbonate of lime, may deposit from alkaline urine.

Uric acid is deposited from urine when in excess as red grains like cayenne pepper, consisting of crystals, usually of a rhombic prism shape and of a dark yellow colour under the microscope; these rhombic crystals are frequently grouped into star-shaped forms. The edges are frequently rounded off and the shape modified, especially in urines containing mucus or albumin, but the pigmentation of the crystals is characteristic.

The normal amount of uric acid excreted varies from 5 to 10 grains a day, but it is markedly increased in fevers, liver diseases, rickets, scurvy, and leuchæmia, and especially after an attack of gout. On the contrary, it is diminished during the attack of gout, and after large doses of quinine.

Urates are deposited as a loose powdery deposit, forming a non-coherent mass at the bottom of the urine-glass, and forming a film on the side of the glass which is characteristic. Its chemical composition is variable, being a compound of uric acid with potash, soda, ammonia and lime, sometimes one, sometimes another, of these bases preponderating. Microscopically it consists of fine or coarse amorphous granules.

The colour of the deposit is yellow, orange or pink—in fact, any of the different shades of bricks. It dissolves on heating, and is the only urinary deposit which does so. Clinically, the sediment occurs after profuse sweating or in cold weather; pathologically, in fevers, cases of stone in the kidney, and in diseases of the liver or heart, and in all disease accompanied by wasting of tissue.

Urate of sodium is sometimes deposited from the urine in hedgehog-shaped crystals, especially in children suffering from febrile disorders.

Oxalate of lime deposit is usually very scanty, and looks like a slight cloud of mucus, but the sides of the urine-glass often have a scratched appearance due to the deposit of crystals on its inequalities.

Microscopically, the crystals are octahedra, appearing as squares crossed diagonally by two lines from corner to corner, 'envelope shape.' Sometimes the crystals are in the form of biconcave oval discs, and appear as circles or dumb-bells.

If this deposit be constant and large, certain hypochondriacal symptoms may appear, and then the disease is sometimes called oxaluria; or the deposit may form a calculus in the renal pelvis.

Leucin and tyrosin are occasionally deposited from the urine in acute yellow atrophy of the liver and phosphorus-poisoning, taking the place of urea. More usually the urine has to be concentrated before they are deposited. They are a product of the disintegration of albumin, and have occasionally been seen in cases of typhoid fever and pernicious anæmia.

Leucin appears as yellowish balls concentrically and radially striated, and tyrosin as needles often crossing each other at one spot, thus resembling a bundle of needles tied at the middle by a thread.

Cystine has been very rarely found in human urine in patients who had a stone of this composition in the kidney or bladder It forms colourless flat hexagonal crystals, and occasionally hexagonal prisms.

Phosphates are deposited from alkaline or neutral urine in three forms: amorphous calcic phosphate ($Ca_3PO_4)_2$; crystalline calcic phosphate ($CaHPO_4 + 2H_2O$); and ammonio-magnesic phosphate ($MgNH_4PO_4 + 6H_2O$). The first and third are frequently

found together as the so-called mixed phosphates. The lime salts often come down on heating urines, as they are less soluble in hot solutions; they are dissolved by adding acetic or other acids, and so are distinguished from albumin.

Phosphates are often precipitated by addition of an alkali to the urine; hence the addition of Fehling's solution may cause their appearance.

The deposit is white, and often has a granular appearance when unmixed with mucus or pus.

Crystalline calcic phosphate occurs as stars or rods; hence it is often called 'stellar phosphate.'

Ammonio-magnesic phosphate, or triple phosphate, occurs as a snow-white deposit and scum on the urine; its form is a triangular prism with bevelled ends—'knife rest' or 'coffin-lid' crystals. It occurs generally in alkaline urine, but occasionally in urine which is neutral, or even faintly acid.

Carbonate of lime is sometimes deposited as opaque spheres or dumb-bells in decomposing urine.

Urate of ammonia occurs as hedgehog-shaped masses in urine which is decomposing.

2. **Organized Sediments**—(1) *Blood.*—This has already been mentioned; with it, when the hæmaturia has continued for some days, a sediment of hæmatoidin may appear as needle-shaped crystals or tables or granules; this denotes chronicity of the bleeding. Blood will only give rise to a very small amount of albumin in the urine.

(2) *Extrarenal Epithelium.*—This may come from any part of the urinary tract. Squamous epithelium lines the urethra, and that variety seen in the urine comes from this part; it may be seen in patients who have formerly had gonorrhœa or other urethritis.

Vaginal epithelium is also squamous, and consists of large flat horny-looking cells, with a nucleus round which are often a few granules.

Epithelium from the bladder, ureter and pelvis of the kidney is transitional in character, and the cells are either small and flat with large nuclei, or pear-shaped, spindle-shaped, ovoid, or irregular. Cells of this character strengthen the diagnosis of pyelitis if they be fairly numerous, but they must not be mistaken for cancer cells.

(3) *Cancer cells* resemble very closely those from the upper urinary passages; they are of very irregular shape, the most characteristic being a spindle shape. There are also very numerous blood corpuscles, but few or no pus cells. The presence of shreds of tissue is almost a certain proof of the presence of a malignant growth. To the naked eye the sediment of a cancerous case is usually dirty and thick.

(4) *Renal epithelium* may be detached as single cells or form portions of casts.

The normal epithelium is more or less cubical, with a well-defined nucleus; and cells of this character may appear in the urine, or the cells may be filled with fatty granules, obscuring the nucleus, or the cells may be more or less disintegrated, or the nucleus may be seen divided into two or three. The presence of one or two of these cells in a specimen may be physiological, but if numerous they indicate organic disease of the kidney.

(5) *Renal casts* may be—

Blood casts.
Epithelial casts.
Granular casts.
Fatty casts.
Hyaline casts.

Blood casts are cylinders composed wholly or partially of blood corpuscles; they are indicative of acute inflammation of the kidney.

Epithelial casts consist of a cylindrical framework studded with epithelial cells; these are seen in rather more chronic cases than the preceding.

Granular casts have a dark granular appearance.

Fatty casts consist of clear cylinders studded with adherent fat drops; these and the preceding are seen in chronic renal disease, especially the large white kidney.

Hyaline casts consist of delicate glassy cylinders, not easily seen in the urine till tinted by iodine or magenta; they are of very various diameters.

Casts have been found in small quantities in persons with apparently healthy kidneys; these are generally of the hyaline variety.

HYALINE AND FATTY CASTS.

EPITHELIUM IN THE URINE.

a and *b* from pelvis of kidney and ureter; c^1, c^2 from bladder.

Casts, few in number, may appear in any case of congestion of the kidney, as in heart disease, fevers, or after a cold bath;

if numerous, however, they indicate inflammation of the kidney.

(6) *Pus* in the urine forms, if in quantity, a dense yellowish

FATTY AND GRANULAR CASTS.

EPITHELIAL CASTS.

PUS IN URINE.

white sediment, the surface of which does not remain horizontal when the urine-glass is tilted. Urine containing much pus becomes ropy and semi-gelatinous on the addition of liquor potassæ. Under the microscope the multinucleated pus-cor-

puscles are seen. Tho amount of albumin contained even in a large amount of pus is very small.

Pus may in women come from the genital passages, and in men with urethritis from the urethra; these causes must first be excluded. If the pus come from the bladder, the urine is usually alkaline and ammoniacal, and then the causes of the cystitis must be looked for.

Pus from the renal pelvis usually appears in acid urine, and may be mixed with cells of transitional epithelium; the causes of the pyelitis are usually stone, tubercle, or the bursting of an abscess into this part. The abscess may have arisen either in or around the kidney.

(7) In urine may often be found *torulæ*, which have appeared since micturition; also *sarcinæ*, like those met with in vomit, occur in some cases of cystitis; again, various kinds of *bacteria* may be frequently seen.

The bacillus of tubercle has been seen in some cases of advanced disease of the urinary tract.

Albumin.—The proteids which appear in abnormal urine are serum albumin, serum globulin, peptone, and hemialbumose; of these, the two first are of importance clinically.

Tests.—Boil the acid urine in a test-tube, and if a turbidity be produced, not altered by addition of acetic acid, albumin is present; if this turbidity be removed by a few drops of the acid, it is due to a precipitate of the earthy phosphates. A delicate way of applying this test is to nearly fill a test-tube with urine, and boil only the upper layer; if this becomes turbid, to acidulate slightly, and see if it clears up. In this way the slightest turbidity can be detected by comparing it with the lower layer of clear urine.

Another test is to pour about 1 inch deep of urine into a test-tube, and then gently to pour down the inclined tube strong nitric acid; this sinks to the bottom, and if albumin be present a ring of opaque coagulated albumin will show at the junction of the liquids. If there be only a trace of albumin, several minutes' contact with the nitric acid is necessary.

This test must not be applied to urine which is turbid from urates, nor to concentrated urines, as then nitrate of urea is deposited, and may be mistaken for albumin. The urine of

patients taking copaiba or cubebs will also give a ring at the junction of the urine and the nitric acid; the odour of the urine will show the fallacy.

Urine containing mucus will show a haze, not at the junction with the nitric acid, but above this level, and can be distinguished by this fact.

It is very important to have some idea of the **quantity** of albumin in the urine; a rough method is to boil a specimen of the mixed urine of twenty-four hours, and, after adding nitric acid, to note the height for albumin deposited after two or three hours' standing, comparatively to the total height of the urine, noting it in fractions, as $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, and so forth.

Esbach's albumimeter is a more accurate instrument; it is a tube into which urine is poured up to a mark U; then the reagent (10 grammes picric acid with 20 grammes citric acid, made up to 1,000 grammes with water) is added to the point marked R; the tube is then shaken, and left for twelve hours, when in albuminous urine a precipitate will have fallen, the height of which may be noted by marks on the lower part of the tube, each of which marks $\frac{1}{10}$ per cent. of albumin.

Another test for albumin is a saturated solution of picric acid, poured gently into a test-tube, giving a ring at the junction of the liquids; this is a delicate test, but is also given by mucin, peptone, and the urine of patients taking quinine.

The ferrocyanide of potassium test was introduced by Dr. Pavy. A drachm of urine is taken, and a pellet containing citric acid is dropped in and dissolved, then a pellet containing ferrocyanide of potassium; a precipitate occurs if albumin be present.

Albumin is, of course, to be found in the urine whenever that contains blood or pus, but either of these only accounts for a very minute quantity of albumin; and if there be a large quantity in the urine, it indicates that there is some other source for the albumin.

Albumin may appear in the urine—

1. In acute and chronic Bright's disease, including amyloid kidney.

2. In pregnancy or the puerperal state, when the kidney may or may not show structural changes.

3. In any disease in which fever is a marked symptom.

4. In passive congestion of the kidney from any cause, most usually due to obstructive heart or lung disease, or pressure on renal veins by an abdominal tumour.

5. In the condition called 'functional albuminuria,' in which there is no real renal disease; this may be produced by muscular exertion, dyspepsia, cold bathing, etc.

6. Occasional in disturbances of the nervous system, as after cerebral hæmorrhage.

Sugar in the Urine.—Sugar may appear in the urine—

1. In diabetes mellitus.

2. In small amounts (glycosuria) after inhalation of chloroform or ether, after recovery from cholera, and after paroxysms of any disease increasing the amount of CO_2 in the blood, as whooping-cough, asthma, or epilepsy; also after certain cerebral lesions; finally in connection with certain digestive disturbances, especially those of a gouty nature. In these cases it is usually small in quantity, and of a temporary nature.

Diabetic urine is usually pale, and of a sweetish smell and taste; the usual urinary odour is absent. If any amount of sugar be present, the specific gravity will be increased. The amount of urine passed in the twenty-four hours is usually greatly increased, often up to 15 or 20 pints.

Tests for Sugar.—1. *Fehling's test* consists of two solutions. No. 1: Sulphate of copper 346·4, distilled water to 5,000. No. 2: Caustic soda 765·625, tartrated soda 1,750, distilled water to 5,000. Of these, equal volumes are to be mixed when required, then boiled, and the suspected urine added, when, if sugar be present, cuprous oxide is deposited as a yellowish-red turbidity which on resting sinks to the bottom.

Many substances are said to give the same reaction with Fehling's solution, but chloroform and chloral are the only substances likely to be found in urine which really do so. Borax, salicylates, etc., often give a greenish colour, getting yellowish and cloudy on standing, but there is no real likeness to Fehling's sugar reaction.

The delicacy of Fehling's solution may be made greater by diluting with water till the blue colour is only just visible, when, with an exceedingly small quantity of sugar, there will be produced a yellow coloration on boiling.

2. *Phenylhydrazin Test.*—Two parts of phenylhydrazin hydrochlorate are mixed with 3 parts of acetate of soda, and dissolved in water. Some of this mixed with a urine containing sugar, and heated for fifteen minutes in a water-bath, and allowed gradually to cool, will deposit a yellow sediment, which, examined under the microscope, consists of bunches of yellow needle-shaped crystals of phenylglukosazone. This test is said to be very delicate, but is not more so than that of the diluted Fehling's solution mentioned above.

Quantitative Estimation of Sugar.—1. Put 10 c.c. of Fehling's solution into a porcelain capsule or a flask, dilute with about 20 c.c. of water, and boil, adding drop by drop from a eudiometer urine diluted ten or twenty times with water till the blue colour is completely discharged. This will be done when 0·05 of a gramme ($\frac{1}{4}$ grain) of sugar is added, and this will be contained in the urine added; then the calculation how many grammes are passed in the day is simple.

2. Pavy's solution is prepared of the same strength as the preceding, and the method is similar; but as the copper oxide is held in solution by excess of ammonia, it is perhaps easier to say exactly when the blue colour has disappeared. The solution contains 178 grains of tartrated soda and of caustic potash, $36\frac{1}{2}$ grains of copper sulphate, strong ammonia 6 ounces, and water up to 1 pint.

3. *Fermentation Test.*—Fill two eight-ounce bottles with the mixed urine of twenty-four hours, plug both with cotton-wool, putting into one a bit of German yeast the size of a pea, and put in a warm place for twenty-four hours; then take the specific gravity of each, and the difference between the last two figures of this will be the number of grains of sugar per ounce of urine.

Diacetic acid, oxybutyric acid, and acetone occur together in those severe cases of diabetes when coma is impending.

The test for acetone is to add to the urine a small quantity of a saturated solution of soda nitroprusside and some caustic potash; this gives a red colour, fading quickly. Add acetic acid, and the colour becomes purple.

Ferric chloride gives a red colour with diacetic acid without boiling, but this is an uncertain reaction, as so many other substances give it.

Many medicines appear in the urine, and may give reactions which simulate those of other substances. Gum resins, etc., such as copaiba, give with nitric acid a whitish deposit, sometimes mistaken for albumin; it is recognised by its characteristic smell. Iodine or bromine gives a reddish colour with fuming nitric acid which is soluble in chloroform.

Salicylates give a blue-violet colour with ferric chloride. Carbolic acid colours the urine brownish-black, due to hydrochinon.

ACUTE NEPHRITIS

frequently arises towards the close of scarlet fever in children, often causing no obvious symptom except œdema; but when not arising in the course of any other disease, it may begin with shivering and slight fever, headache, bad appetite, furred tongue, constipation and vomiting. The urine may be passed very frequently, but is small in amount and contains a varying quantity of blood, giving a red or chocolate-coloured deposit which contains altered blood corpuscles, swollen epithelial cells, and hyaline and blood cysts. There is always some albumin, but the amount varies greatly.

The amount of urea is diminished.

Occasionally there is lumbar pain. Dropsy is usually present universally, but is most marked about the eyelids.

CHRONIC NEPHRITIS.

1. **Large White Kidney.** — This may follow on acute nephritis or start insidiously. The earliest symptom is frequently dropsy of the renal type. The urine may be scanty and of high specific gravity, or abundant and of lower specific gravity than normal; there is albumin present, from a small amount up to an amount which makes the urine solid on boiling; hyaline, epithelial, fatty, and granular casts are present often in large numbers, and occasionally blood is present.

The patient gets very anæmic, suffers from headache and occasional vomiting, the pulse becomes hard and incompressible, and the heart hypertrophies; frequently lung complications ensue, or pleurisy with effusion. The sight may become impaired, and retinal changes appear.

2. **Granular Contracted Kidney (Renal Cirrhosis)**, as a rule, comes on insidiously in the subjects of chronic gout, or lead-poisoning, or chronic alcoholism. The symptoms may bo few; the patients suffer usually from general weakness and exhaustion, while the other symptoms may group themselves as follows:

(1) Gastro-intestinal, as vomiting or diarrhœa or melæna.

(2) Lung troubles, as acute pneumonia or pleural effusion.

(3) Uræmia in its various forms.

(4) Renal dropsy.

(5) Cardiac dropsy, or other symptoms due to a breakdown of the previously hypertrophied heart.

(6) Cerebral hæmorrhage.

The urine is usually pale and of low specific gravity, and much increased in amount; the amount of albumin is small, and now and then albumin may be absent from the urine. Casts are present in but small numbers; they are hyaline or granular.

The pulse is hard and incompressible, and the heart hypertrophied. Retinal changes are more frequent in this than in any other form of kidney disease. Less frequent symptoms are epistaxis, purpura, and hæmorrhages from the stomach or intestines.

LARDACEOUS KIDNEY

is a part of the change also affecting the liver, spleen, intestines, etc.

Dropsy is a marked symptom, as a rule. The urine is usually increased in amount and of low specific gravity, containing much albumin and some hyaline and granular casts. Occasionally swollen epithelial cells are found which stain dark brown with iodine.

Cardiac hypertrophy is less frequent in this disease than in renal cirrhosis, and retinal changes are not frequent, and uræmia is rare.

The diagnosis is made by the presence of one of the known causes of lardaceous disease, and by the indications of lardaceous disease of the liver and spleen.

RENAL CALCULUS.

The symptoms of this are usually lumbar pain of the kind described above, renal colic with occasional attacks of hæma-

turia, or presence of pus in the urine; occasionally, if the opposite kidney be incapable of secretion, obstructive suppression is set up.

The diagnosis is made, as a rule, from the recognition of pyelitis, which causes the presence of pus in acid urine; the chief causes of this are calculus or tubercle in the renal pelvis. The absence of the specific signs of tubercle mentioned below, and the occurrence of severe attacks of renal colic, suffice for a diagnosis, as a rule; but the bladder must always be sounded, as stone in the bladder may cause symptoms almost indistinguishable from renal calculus.

TUBERCULAR PYELITIS

occurs chiefly in young adults who have a family history of tubercle.

There is frequently lumbar pain and tenderness, and sometimes attacks of pain resembling those caused by stone. The urine may contain pus or blood, and in the pus, with care, the bacillus of tubercle may sometimes be found. There sometimes is hectic fever. The patient emaciates, and may show signs of tubercle in the lungs. The testicles and prostate should always be examined for tubercular disease.

MALIGNANT DISEASE OF THE KIDNEY.

Sarcoma occurs occasionally in infants, causing great abdominal enlargement, due to the growth in one kidney, which frequently reaches a large size. There may be hæmaturia.

Carcinoma occurs in persons past middle age; the onset is insidious, and pain may be present or absent; blood may occasionally appear in the urine. A tumour may gradually appear, having the characters of a kidney enlargement. The patient becomes weaker and thinner till death ensues.

HYDRONEPHROSIS

may be unilateral or bilateral.

Bilateral hydronephrosis may be suspected when a patient suffering from stricture or enlarged prostate passes rather dilute urine containing albumin; there are usually no symptoms.

Unilateral hydronephrosis may cause a fluctuating tumour to appear occasionally on one side of the abdomen, whose occasional disappearance follows the emission of a large amount of slightly albuminous urine. But little trouble is caused if the other kidney be healthy, but if this be inactive, symptoms of uræmia may after a time appear, and cause death.

This condition has to be diagnosed from two rare conditions: large renal cyst or hydatid.

MOVABLE KIDNEY

is most common in women about middle life who have had numerous pregnancies; it is most common on the right side. It may cause no symptoms, or may cause a feeling of weight and pain in the abdomen and loins, with occasional attacks of severe abdominal pain, accompanied sometimes by nausea and vomiting. The kidney may at times be very tender.

The diagnosis is made by feeling a movable lump of the shape and size of the kidney, the pressure of which causes a peculiar sickening pain.

It has to be diagnosed from fæcal accumulations, enlarged spleen or lymphatic glands, or a distended gall-bladder.

CHAPTER VIII.

DISEASES OF THE NERVOUS SYSTEM.

THE BRAIN.

Symptoms.

Coma is unconsciousness, and may be more or less complete. It may arise in the course of many brain diseases, as meningitis, tumour, or abscess of the brain, or it may be produced by high fever along; in these cases the history is often sufficient to ascertain the cause.

Sudden coma may be produced by cerebral hæmorrhage,

by poisons, as alcohol or opium, by blood states, especially uræmia, or occasionally be produced by epilepsy, or occur in the course of general paralysis of the insane or disseminated sclerosis.

Alcoholic coma is rarely complete; the patient can usually be roused, the skin is often flushed, the pupils large; there is no real paralysis and no convulsions.

In coma from opium-poisoning the pupils are strongly contracted; the coma gradually deepens. Fluid removed from the stomach may give a blue colour with ferric chloride, indicating the presence of opium.

In uræmic coma there may be general œdema, the skin is usually pale, there is no paralysis, but convulsions may occur. The urine will be found to contain a large amount of albumin.

In coma from cerebral hæmorrhage there will be paralysis of the limbs on one or both sides, and the face will be paralyzed on one side; the pupils may be unequal, or sometimes contracted; the urine frequently contains a small amount of albumin.

In coma from epilepsy there will usually have been a preceding convulsion, in which the tongue has been bitten and the clothes wetted with urine; there is no paralysis.

In examining a case of coma occurring without previous obvious disease, the history, if obtainable, may assist. The breath should be noted, as it may smell of alcohol; but it must be remembered that alcohol is frequently given to persons found unconscious.

In examining for paralysis, it may be found that though all the limbs, on being raised, drop on the bed, those which are paralyzed drop more suddenly and appear more flaccid than the unparalyzed limbs. The pupils may be dilated in alcohol, uræmia, or cerebral hæmorrhage, but in the latter are usually unequal; but in hæmorrhage into the pons or into the lateral ventricles they may be strongly contracted.

The urine should be examined in all cases.

Loss of Motion (Hemiplegia).—In the ordinary form of hemiplegia there is paralysis of one side of the face, and of the limbs of the same side; the tongue, when protruded, deviates to the paralyzed side. The affection of the face is most marked

about the mouth. When the patient shows the teeth, the mouth is drawn to the unparalyzed side, and the naso-labial fold of that side is most marked; but if the eyes are tightly closed, it will be noted that most wrinkling occurs on the unparalyzed side; the same is seen on raising the eyebrows or frowning.

At some period there is usually rigidity of the paralyzed side, as a rule occurring a week or two after the onset. There may be loss of sensation of the paralyzed side, but this is absent in the majority of cases, its presence, as a rule, showing that the lesion has interfered with the posterior part of the internal capsule.

In hæmorrhage into the pons Varolii there is often paralysis of both legs only or chiefly, or of all four limbs, often with anæsthesia. Mitral convulsions are frequent, the pupils are contracted, vomiting is frequent, and there is often hyper-pyrexia.

The diagnosis between the usual seats of a lesion causing hemiplegia is given in a tabular form.

Cerebral Hæmorrhage.	Cerebral Softening.	
	Thrombosis.	*Embolism.*
May be produced by blow or fall in a healthy person.	Occurring in weakly or debilitated persons.	
Premonitory Symptoms: Rare.	Frequent.	Rare.
Loss of consciousness: Frequent.	Rare.	Rather frequent.
Convulsions: Rare.	Occasional.	Frequent.
Fall of temperature: Marked.	Not marked.	Not marked.
Inflammatory reaction: Slight.	Pronounced.	Pronounced.
Aphasia: Uncommon.	Frequent.	Frequent.
Hemiplegia: Complete.	May be partial.	May be partial.
Mind intact.	Often mental failure follows.	Often mental failure follows.
Heart hypertrophied.	Heart dilated.	Heart dilated; often mitral disease.
Urine albuminous.		
Age over fifty.		Middle age.

Loss of Sensation.—There are three kinds of common sensation—touch, pain, and the temperature sense—besides which an ordinary form is a loss of knowledge of the position of the limbs. The usual loss of sensation is hemianæsthesia, which may be due to a lesion in the neighbourhood of the optic thalamus, in which case there is loss of the field of vision of both eyes on the side of the lesion (hemianopia). Hemianæsthesia may also be due to hysteria, in which case there is often dimness of sight of the eye of the same side. Disease of the pons may cause slight universal loss of sensation, seldom complete. The lesions in the spinal cord causing sensory losses will be given later.

Headache is a symptom of many nervous diseases. The most intense headache is that produced by cerebral tumours; this may prevent the patient from sleeping. A local headache may show some lesion of the brain, and especially of the meninges beneath its seat.

The other causes of headache are—

1. Neuralgic—generally shooting along the course of certain nerves of the scalp, especially about the occipital region; these nerves are usually tender on pressure.
2. Congestive—a dull beating pain, usually frontal or occipital.
3. Anæmic—generally on the vertex.
4. Gastric—usually frontal or temporal.
5. Toxæmic—a dull headache, often like the pressure of a band round the head, frequently due to Bright's disease.
6. Syphilitic—due to some vascular change or meningeal inflammation, or disease of the cranial bones.
7. Ophthalmic—often seen in young myopic patients; usually frontal.
8. Clavus hystericus—a severe localized pain of a boring character; usually temporal.
9. Migraine, beginning as a rule on one temple, or above one eye, but after a time becoming bilateral.

Migraine consists in occasional attacks of headache, usually accompanied by nausea and vomiting.

Previous to the commencement of the headache some slight defect is common; there may be hemianopia, or loss of vision of some part of the retinal field, the outer edge of which is frequently irregular, giving the appearance of 'fortifications'; or

there may be some transitory general weakness of sight. Occasionally there is numbness, tingling or cramp in a part of the arm or leg, or even temporary aphasia. After about half an hour the headache begins usually in one temple, whence it spreads and may become general and very severe; after some hours nausea and vomiting come on, and the headache gradually passes off.

The diagnosis is from malarial headache by the history, or, if the visual area is very marked, from the petit mal of epilepsy.

Cerebral Tumour.—The symptoms common to most intracranial tumours are headache, vomiting, and optic neuritis, and often giddiness and general convulsions. The headache is generally constant, and so severe as to disturb sleep; the vomiting is sometimes unaccompanied by nausea, though this is by no means constant. Optic neuritis is as a rule bilateral, and very intense.

Other occasional symptoms are local tenderness of the skull, mental disturbances, including stupor and coma—which often precede death—local paralyses of face, arm or leg, and sometimes localized twitchings or tonic contractures; occasionally general convulsions, like epilepsy, or sensory disturbances, or paralyses of certain cranial nerves.

Anæmia or kidney disease may cause headache, vomiting, and optic neuritis, but rarely are these so well marked as in cerebral tumour, and the focal symptoms are absent.

Hysteria may cause many symptoms, like tumour, but they generally have a more rapid onset, and are generally accompanied by characteristic hysterical symptoms, as aphonia or hemianæsthesia.

In epilepsy there are no symptoms between the fits; in tumour some are generally present.

In abscess of the brain the presence of a cause, such as injury, ear disease, etc., helps the diagnosis; but the symptoms may be very like those of a tumour.

The **seat** of the central tumour may be occasionally suspected from the locality of pain and tenderness, and from the interference with certain nervous functions; for example, a lesion paralyzing or causing convulsions of one arm only would probably be on or beneath the arm centre on the cortex cerebri, while a lesion paralyzing two or more cranial nerves whose nuclei are near together

might be in the part of the brain where the nuclei are situated, or if the paralyzed nerves run near each other in any part of their intracranial course, it is probable that the paralyzing lesion is in this neighbourhood.

The symptoms of **cerebral abscess** are often very obscure especially at first, when they may be latent, or headache, vomiting, rigors and fever be present. These early symptoms, if they occur at all, pass off, and a latent period of some months may elapse; finally headache comes on again with vomiting and giddiness, there are often convulsions or a local paralysis, also a mental disturbance going on to stupor and coma. There is often intermittent fever with rigors.

The diagnosis is very difficult, as often the abscess is almost latent till it bursts, producing coma and death. The presence of a cause, as local injury, ear disease with a foul-smelling discharge from caries of the mastoid bone, or a focus of suppuration in another part of the body—especially the lungs—helps greatly. The diagnosis has to be made from tumour, meningitis, cerebral hæmorrhage, or softening, or pyæmia.

Tumours generally cause some localizing symptoms, rarely have a definite cause, and progress more slowly.

Cerebral hæmorrhage is sudden in onset, has no previous symptoms, and does not cause marked optic neuritis.

Meningitis may co-exist with abscesses, and the same causes may lead to both; but meningitis generally causes more cranial nerve palsy than abscess.

Tenderness of the cranium may be produced by neuralgia of the nerves covering it, or disease of the bone, usually syphilitic, or inflammation of the subjacent meninges, or by the presence of a cerebral tumour or abscess.

Vertigo is a frequent symptom of brain disease; it occurs especially in tumours of the cerebellum, pons, and middle cerebellar peduncle, also in epilepsy and Menière's disease. Apart from nervous diseases, it is most frequently met with in diseases of the digestive organs.

Vomiting of nervous origin is frequent in meningitis, tumour, or abscess of the brain, and in increase of the intracranial pressure from any cause, such as hydrocephalus. It may not be preceded by nausea, and may be unaccompanied by pain.

Delirium.—Apart from nervous disease, delirium may be produced by certain drugs, as the belladonna group, and certain narcotics. It often accompanies fever from any cause, especially typhoid and typhus fevers; it is also seen in many states of excessive weakness or toxæmias.

Delirium is seen in meningitis, delirium tremens, and many brain diseases, especially cerebral softening.

TUBERCULAR MENINGITIS

has a slow onset, preceded by weeks or days of languor and malaise, wasting, and occasional vomiting; the early symptoms are continuous headache, more frequent vomiting—often without nausea—strabismus, intolerance of light, sound, or movement, rise of temperature from 101° to 103°, irregular in course, pulse irregular, and frequently slow at first. Later come on delirium, retraction of the head, paralysis of certain cranial nerves, often convulsions, alternating with rigidity of the limbs, retraction of the abdomen, insensibility of the pupils to light, and, as a rule, dilatation of them; the pulse may quicken, but remains irregular, stupor comes on, and finally coma, with irregular or Cheyne-Stokes respiration, and finally death in two or three weeks. The bowels are generally constipated throughout, and the patient wastes much. Bronchitic signs in the lungs are frequent. There may be optic neuritis, and tubercles may be seen in the choroid, and the child frequently becomes blind and deaf.

The diagnosis has to be made from enteric fever, in which there is usually more continuous fever, splenic enlargement, more regularity of the pulse, abdominal distension, and not so pronounced nervous symptoms.

Broncho or acute lobar pneumonia may be accompanied by many nervous symptoms in children, but there are more pronounced physical signs in the chest.

Double otitis in children may resemble meningitis, if the fact that ear disease may cause similar symptoms be lost sight of.

A rapidly-growing intracranial tumour may resemble meningitis, but here, as a rule, the optic neuritis is much more intense than in meningitis, and frequently the stage of coma does not supervene.

DELIRIUM TREMENS

is generally preceded by an injury, fever, or excessive drinking, in a previously alcoholic individual. It comes on with loss of sleep and nervousness; there are delusions and hallucinations, and generally much tremor of the hands, tongue, and facial muscles; the pulse is small and quick, and the tongue white and furred. The speech is incoherent and rambling, though the patient may give rational replies to questions; he is very restless, and may be violent.

CONVULSIONS

may occur from gross irritation of the brain, from a sudden **hæmorrhage** into its substance or a vascular disturbance of its surface, from **cerebral embolism** or **thrombosis**; these are usually only of the arm or leg of one side, or, at least, are most marked on one side, and are followed by paralysis, and perhaps by coma.

Convulsions are caused by epilepsy, hysteria, meningitis, hydrocephalus, or other brain lesions, as tumour or abscess, in poisoning by lead or alcohol, or from morbid blood states, as uræmia.

Uræmic convulsions may precisely resemble those of epilepsy; the diagnosis depends upon the other symptoms of Bright's disease, as albuminuria, œdema, etc.

Alcoholic or lead poisoning may also give rise to convulsions, but these only form an incident in a group of characteristic symptoms.

Convulsions in children are usual at the commencement of febrile disorders, taking the place of the rigor in the adult; they are frequent also in rickety children, in whom they occur from any slight reflex cause, as dentition, intestinal disorders, especially worms; some diseases of the lungs, especially broncho-pneumonia and whooping-cough.

They are a frequent early symptom of meningitis, occurring in company with wasting, malaise, vomiting, headache, delirium, squint or ptosis, and retraction of the head, etc., or they may be due to hydrocephalus or other local cerebral cause, as tumour or abscess.

HYDROCEPHALUS

is a disease commencing in infancy, or occasionally *in utero*.

The head of the child has a rounded shape, with bulging, tense and large fontanelles, while the size of it is disproportionate to the size of the small pinched face beneath. The veins of the head are prominent, and the eyeballs are pressed downwards; the intelligence is usually defective, and the senses impaired. Sight may be lost from atrophy of the optic nerve, seen by the ophthalmoscope. The child may be deaf. Vomiting and convulsions are frequent, and wasting occurs. There is more or less paralysis of the legs, which are usually small and wasted.

EPILEPSY

presents itself in two forms, major and minor (*haut et petit mal*). Epilepsy major consists of the recurrence of convulsions, accompanied by loss of consciousness.

The attack may be preceded by an aura consisting in motion, or a sensation of any part of the body, or some sensation referred to the special senses, such as a sight, or sound, or taste, or it may be some peculiar attitude of mind or recurring idea. After this has lasted some seconds, the patient may give a harsh scream, and the fit commences by a tonic spasm of all the limbs, most marked on one side, towards which the head and eyes deviate; soon clonic spasms occur, and the limbs may be jerked in all directions. After this has lasted about a minute, the fit ceases, the patient gradually recovers consciousness, then sinks into a deep sleep, from which he awakes feeling well.

During a fit the pupils dilate, and become insensitive to reflex stimuli; the face at first is pale, but, as the respiration is arrested, it soon becomes cyanosed; consciousness is completely lost; the tongue is often bitten, and the excretions voided; the duration is a few minutes at most. These fits have to be diagnosed from the other causes of convulsions given above.

Epilepsy Minor (Petit Mal).—These attacks vary much in character; they may merely consist of slight momentary losses

of consciousness, giddiness, losses of sight, mental states, peculiar sensations, or a sudden spasm. Their peculiarity is that they are always of the same character in the same individual. The sufferers usually also have distinct fits at intervals. The diagnosis has to be made from cardiac syncope, aural vertigo, and hysteria.

In syncope the attack is more gradual, and is preceded by a feeling of faintness, and succeeded by physical prostration.

In aural vertigo there is usually slight or great persistent deafness and tinnitus, with giddiness.

In hysteria there are usually other evidences, as loss of voice, hysterical fits, etc.

In cortical or Jaeksonian epilepsy the fits usually begin in some definite part of the body, as a finger or toe, and consciousness often persists throughout.

HYSTERIA.

The symptoms of this are so varied and so differently combined that it is best to recapitulate the most usual ones, and to recognise that these may be combined in very various ways.

The mental state is usually emotional, and there is undue self-consciousness, with laughing and crying without adequate cause.

Globus hystericus is a feeling of a ball rising into the throat, stopping the breath. There is often much hyperæsthesia, tender points on the spine or in the ovarian regions; there is occasional sharp limited headache (clavus hystericus). Hemianæsthesia may be present, with often loss of sight of the eye of the same side. Paralysis is very common, especially of the legs; also of the larynx, causing aphonia. Tonic spasms of an arm or hand may occur, or trismus. Tremors are frequent, and sometimes resemble chorea or disseminated selerosis. Convulsive attacks are frequent; they are produced by emotion, and often begin by palpitation or an emotional display. The onset is gradual, and rigidity of the limbs, with convulsive movements, generally of a purposive character, occur; there are occasional screams and attempts to bite the patient's hands or clothes or the bystanders; the duration is longer than in epilepsy, often exceeding ten minutes; the excretions are never voided. Sometimes there is opisthotonus, the head and legs being arched backwards; there

is never complete loss of consciousness, and corneal reflex is present.

These attacks are more common in women, usually about the time of puberty. Retention of urine is common in the hysterical, and anorexia may occur, causing much wasting.

TETANUS

follows a wound or an abrasion of surface, though this may be so concealed as to escape observation.

It begins by stiffness of the jaws and throat, inability to open the mouth widely, the muscles of mastication and of the neck feeling stiff and rigid. Later the features become fixed in a spasm, drawing up the mouth and producing the so-called 'risus sardonicus.' Then comes cramp and spasm of the voluntary muscles, never entirely passing off, but having occasional painful exacerbations. The legs are rigidly extended, and the arm muscles violently contracted, while the muscles of the back and trunk contract violently, so that the body is often bent backwards in an arch—'opisthotonos.' There is also tonic spasm of the respiratory muscles. The mind always remains clear.

The temperature may remain normal, or rise sometimes to an extraordinary height.

The diagnosis has to be made from strychnine-poisoning, hydrophobia, hysteria and tetany.

In strychnine-poisoning the symptoms come on more rapidly, and never commence by trismus, and there is not the severe epigastric pain met with in tetanus.

In hydrophobia the first symptoms are attacks of respiratory spasm, induced by attempts to swallow, and there is no rigidity of the jaw at the commencement.

In hysteria there is no spasm between the convulsive attacks, and there are other evidences of hysteria present.

In tetany the hands and feet are most affected by spasm, and trismus, if occurring at all, is a late and not an early symptom.

HYDROPHOBIA.

There is often local pain radiating from the seat of the bite, with malaise, depression of mind, and a sense of choking and of difficulty in swallowing liquids; this increases and becomes

accompanied by an inspiratory spasm of the muscles of respiration, which rapidly becomes more severe.

These spasms increase in frequency and violence, and may be accompanied by vomiting and general spasm of the trunk and limbs. Delusions and delirium come on. Finally, in a few days, death occurs from asphyxia or syncope.

The diagnosis is chiefly from hysteria in persons who have been bitten.

TETANY

is a disease very common in rickety children and very rare in adults. It is characterized by tonic spasms of the hands and feet. The fingers are flexed at the metacarpo-phalangeal articulations, but extended at the others, the thumb being adducted strongly or flexed into the palm. The wrist is also stiffly flexed. The feet are extended at the ankle-joints and inverted, the toes being flexed. The spasm, if severe, may spread up the limbs, and even the trunk be rigid and the jaws be clenched.

The diagnosis from tetanus is made from the fact that the spasm begins in the extremities and is always most marked there.

WRITER'S CRAMP.

There are three kinds of this affection described by Gowers—the spastic, tremulous, and neuralgic forms.

1. **Spastic.**—In this, when writing, the pen is found to be grasped too tightly, and the hand aches; the writing becomes irregular, and the pen may be driven through the paper.

2. **Tremulous.**—In this form the writing is shaky and there is much tremor of the hand, which ceases when the attempts to write cease.

3. **Neuralgic.**—In this form there is a tonic contraction of the fingers during the act of writing, accompanied by intense aching pain.

In all these forms there is no paralysis of the hand, and any other acts, except that of writing, are unimpaired.

The diagnosis has to be made from difficulties in writing occurring in diseases like disseminated sclerosis and paralysis agitans, which, however, show the other symptoms peculiar to them.

SPEECH DEFECTS.

1. **Speech Alterations.**—In *paralysis agitans* there is delay in commencing a sentence, but the words are uttered quickly; the voice is monotonous.

In *disseminated sclerosis* the syllables are divided, the so-called 'syllabic,' 'scanning,' or 'staccato' speech.

In *general paralysis of the insane* there is imperfect completion of words, and they may be run together—'clipped speech.' Certain consonants, as *l* and *r*, are not properly pronounced, so that words like 'truly rural' or 'Biblical commentator' are slurred over.

In ordinary *hemiplegia* the patient is able to say what he wishes, only the words are often imperfectly pronounced, owing to the weakness of the lips and tongue.

In *bulbar paralysis* there is at first an indistinctness of pronunciation of the lingual consonants (*l*, *r*, *n* and *t*), and gradually the speech becomes inarticulate, whistling is lost, the palate becomes paralyzed, and the pharynx weak—hence swallowing is difficult—the lower part of the face is paralyzed, the lip hangs, and the mouth cannot be closed, and saliva dribbles from its corners; mastication is difficult, owing to paralysis of the cheeks and of the tongue, which cannot be protruded and gradually wastes; the patient becomes emotional and weak, and dies as a rule in two or three years from weakness, failure of the heart's action, septic bronchopneumonia, or choking from inability to swallow.

2. **Aphasia** is caused by a lesion involving the higher centres of speech in the cerebrum, or the fibres proceeding from them.

There are three chief divisions:

Motor Aphasia.—The patient can only utter a few simple words, as 'yes' or 'no,' though he may be able to sing a song, or, under the influence of emotion, may swear. He can't read in most cases. He understands all that is said to him, but cannot repeat it. He is unable to write, though he may copy a word letter by letter. The processes of thought are not interfered with. It is usually due to a lesion in or beneath Broca's convolution, the posterior part of the left third frontal convolution.

This is supplied by the first branch of the left middle cerebral artery, a blocking of which may cause the above symptoms.

Sensory Aphasia if due to disease of the first temporal convolution, supplied by the fourth branch of the left middle cerebral artery. If there be simply word deafness, spoken words are not understood, and as speech depends largely upon hearing one's own words, there are often mistakes in the words used; nouns more especially are misused. The patient is unable to repeat words uttered to him. He cannot write, but frequently can read. The mental processes are unimpaired.

If word-blindness occur, which is a part of sensory aphasia, there is a lesion in the posterior inferior region of the left parietal lobe, and the power of reading or understanding written or printed language is lost.

Amnesia or *Amnesic Aphasia* is when there is simply a loss of memory of words, more especially nouns, without any other word difficulty. It is due to a lesion interrupting the path between the auditory and motor speech centres.

Examination of the Cranial Nerves.

1st or Olfactory Nerve.—Musk or oil of cloves may be used, and each nostril tested separately, the other being closed by the finger.

Loss of smell is generally due to disease of the mucous membrane, but it may be lost on one side from hysterical hemianæsthesia; it is rarely lost in brain disease.

2nd or Optic Nerve.—The sight should be tested in each eye and in different parts of their fundi. To do the latter the observer should close one eye (for example, his left), and the other eye of the patient (right); then, looking into the patient's left eye with his right, and instructing him to do the same, he should stand at a distance of about 18 inches, and gradually bring into the range of vision a small piece of white paper held on the end of a penholder, keeping this at an equal distance from himself and the patient. Judging by his own sight, presumably normal, he can then determine whether the patient's field of vision be limited at any part, either upper, lower, nasal or temporal.

Loss of sight of one eye may be due to disease of the eye

itself or of the optic nerve, in the latter case usually within the orbit.

Disease of the chiasma causes double temporal hemianopia—that is, loss of sight to the temporal side of each eye. It is chiefly caused by tumours of the pituitary body, or by a local basal meningitis.

Disease of the visual tract behind the chiasma causes homonymous hemianopia—that is, loss of vision in the opposite side of the body in both eyes. It is most frequently seen in cerebral softening, causing loss of sight to the paralyzed side, but may be caused also by tumours. If combined with hemianæsthesia, it is due to a lesion of the optic thalamus.

Occasionally a transient hemianopia is seen in migraine.

Crossed amblyopia means loss of sight in the eye of the side opposite to a cerebral lesion; it is seen in disease of the posterior part of the parietal lobe, above the angular gyrus. There is usually also concentric diminution of the visual field in the eye of the same side.

Disease of the above-mentioned part appears sometimes to produce an inability to understand the nature of seen objects, such as food or letters, etc. This is called 'mind blindness.' If blindness of one eye arise with anæsthesia of the same side of the body, the disease is certainly functional.

The optic papilla should be examined by the ophthalmoscope for:

1. Optic neuritis when it is reddened, raised with a blurred edge, and the vessels over it lost or indistinct, though on the retina they are seen to be enlarged.

It is probably most intense in cerebral tumour, less so, or absent altogether, in abscess, meningitis, hydrocephalus. It is also seen in lead-poisoning, after fevers, in the various kinds of anæmia, and in Bright's disease.

2. Double optic atrophy is chiefly met with in tabes or disseminated sclerosis. The disc is seen to be dead white, edge very distinct, surface rather depressed, and the vessels very small.

3rd, 4th and 6th Nerves.—May be examined together. They control the ocular movements, and if the patient's eyes be directed in various directions, any paralysis of a muscle may be made out.

The 3rd nerve also controls the movement of the levator palpebrarum, and if it be paralyzed ptosis of that side occurs,

together with dilatation of the pupil (as it supplies the sphincter iris), and a turning of the eyeball outwards. There is also loss of accommodation for near vision in the affected eye, as the 3rd nerve supplies the ciliary muscle, and the pupil will not contract on looking at a near object. Paralysis of the ciliary muscle occurs in diphtheritic paralysis, tabes, and occasionally, owing to degeneration of the nuclei of the 3rd nerve, in the course of other nervous diseases.

The pupil does not become smaller on exposure of the eye to light in tabes, or disease of the 2nd or 3rd nerve or optic tract. Each eye should be tested separately while the other is kept well shaded, and the light used should be fairly strong.

The eyes should be tested for *nystagmus*, which consists of a series of oscillations in the plane of the primary eye movement. The patient's eyes should be directed to move somewhat rapidly to either side, when, if present, the nystagmus will appear.

It occurs in local affections of the eye impairing the sight, also in those who habitually strain the ocular muscles, as miners, watchmakers, or telegraphic operators, and in certain nervous diseases, especially disseminated sclerosis and Friedrich's disease, occasionally in brain tumour and other cerebral diseases.

5th Nerve.—Damage of the sensory portion causes anæsthesia of that side of the face, skin and mucous membrane, including half the tongue and palate, and the eye on the same side, but no loss of taste unless the lingual nerve be affected below where the chorda tympani joins it. If the affection remain there may occur loss of smell, owing to trophic changes in the mucous membrane, and the eye may inflame from the same cause.

Irritative disease or reflex causes may produce neuralgic pain over any part of the region supplied by the nerve.

Damage of the motor portion causes weakness and wasting of the muscles of mastication on the same side, which can be noted by the fingers placed on the contracted masseters and temporal muscles, and also the patient cannot move his jaw to the unaffected side.

The nerve may be damaged by hæmorrhage or tumours at its origin, or by tumours or meningitis or caries of bone at the base of the skull, or by injury in its course.

The diagnosis of the seat of disease is got from accompanying symptoms. If there be paralysis of the opposite arm and leg, it is due to disease of the pons. If the 6th nerve of the same side be also affected, it is due to disease in the region of the cavernous sinus.

7th Nerve.—Paralysis of this nerve causes complete paralysis of the muscles of the face, and prevents closure of the eye, but no paralysis of the soft palate or uvula. If the nucleus be affected within the pons, there is usually paralysis of the 6th nerve of the same side, and weakness of the limbs on the opposite side; this may be due to hæmorrhage or tumour, or to glosso-labio-laryngeal paralysis or other nuclear degeneration.

If the disease be at the base of the brain, the 8th nerve is usually affected; this may arise from tumours or meningitis.

Disease of the facial nerve in its canal is usually due to otitis media, with caries of the petrous bone in children, injury to the petrous bone or to rheumatic neuritis. When the nerve is diseased between the geniculate ganglion and the origin of the chorda tympani, there is loss of taste in the anterior part of the tongue of the same side.

If the tract from the cortex above the nucleus be affected, there is paralysis of the lower part of the face on the same side, and only slight weakness of the forehead and eyelid, while emotional movements persist; this is usual in ordinary hemiplegia.

Facial spasm, or convulsive tic, may be due to disease irritating the nucleus, or to reflex irritation (usually of carious teeth), or to some mental condition. It consists of clonic spasms of some part of the face or eyelid. Also after hemiplegia there may be a tonic contraction of the affected facial muscles, which deepen the naso-labial fold, and draw the mouth towards the affected side.

8th Nerve.—In a case of deafness of one or both ears, a vibrating tuning-fork should be placed close to the ear, and when the sound has ceased to be heard the end should be placed in contact with the adjacent skull. If the sound be again heard, the deafness is due to the middle or external ear; but if the sound be heard equally well through bone and air, there is disease of some part of the auditory nerve. This may be due to

inflammatory conditions within the labyrinth, or rarely to causes inside the skull, as meningitis, morbid growths, etc.

Nervous deafness is occasionally met with in tabes.

Tinnitus, or noises in the ear, may be due to wax in the external meatus, blood conditions, as anæmia, or diseases of the nerve itself.

9th Nerve.—Is the nerve of taste to the back of the tongue, and probably has other functions, not yet conclusively worked out.

To test taste, the patient should be told to protrude his tongue, and the substance to be tasted should be placed on with a small brush, the patient nodding or shaking his head to signify whether he tastes or not before he returns his tongue to his mouth.

The solutions used are saccharine, saline, and acid, and each side and front and back of the tongue may be tested separately.

This nerve is rarely or never paralyzed alone, but usually with the two following.

10th and 11th Nerves.—Are usually taken together, as though the nucleus of the first is either sensory or supplies involuntary muscle, all striated muscle is supplied by its trunk, as to the laryngeal muscles, etc., and these are in reality innervated by the nucleus of the spinal accessory.

Damage to the nerve nuclei occurs in the disease called chronic bulbar paralysis, or very rarely in hæmorrhage into the medulla, the symptoms produced by disease of these nerves being paralysis of the palate, pharynx, œsophagus—causing difficulty in swallowing—weakness of the vocal cords, rapid pulse, and attacks of dyspnœa.

The nerve trunk may be damaged wholly or in part; if the latter, the left recurrent laryngeal branch suffers most frequently, as in aneurism of the transverse arch of the aorta, causing paralysis of the left vocal cord, with its characteristic symptoms of hoarseness and inability to cough, or paralysis only of the abductors, causing inspiratory stridor. Pressure on the vagus nerve trunk may be due to growths or enlarged glands in the thorax or neck, and may cause symptoms like the above, and perhaps has some effect on the heart's action and the movements of the stomach. If, on the contrary, the vagus be stimulated by the pressure, the heart's action may be slowed, and vomiting occur.

The spinal part of the 11th nerve innervates the sterno-mastoid and the upper part of the trapezius, and hence paralysis causes the shoulder to fall; and if the disease be bilateral, the head falls forward, as is seen in progressive muscular atrophy, where this muscle is usually affected in part.

12th Nerve.—Disease of the nucleus is seen in bulbar paralysis, or by the pressure of a tumour at the base of the brain; it may be damaged by meningitis or growths. This causes the tongue, when protruded, to turn to the paralyzed side; articulation and mastication are impaired, and later on the affected side of the tongue shrinks, and the mucous membrane lies in folds over it, owing to wasting of the muscular fibres.

Disease above the nucleus, in the tract from the ascending frontal convolution to the nucleus, causes paralysis of the tongue on the opposite side.

Examination of the Spinal Nerves and Cord.

The following points should be noted in the arms and legs:

1. Strength of muscles.
2. Tremor.
3. Nutrition of muscle.
4. Sensation to touch, pain, and temperature.
5. Paræsthesiæ.
6. Muscular sense.
7. Trophic changes.
8. Nerve tenderness, etc.
9. Reflexes, deep and superficial.
10. Gait.
11. Muscle and nerve electrical reactions.

The muscles may be tested in groups according to their actions. Loss of strength in both arms, coming on rapidly, is generally due to acute anterior polio-myelitis or hysteria; coming on slowly, may be due to neuritis (generally lead or alcohol), anterior polio-myelitis, paralysis agitans, etc.

THE SPINAL CORD.

Paraplegia may be of slow or rapid onset; the latter are acute myelitis, sudden compression of the cord, and acute anterior polio-myelitis.

PARAPLEGIAS OF RAPID ONSET.

Acute Myelitis gives rise to weakness or paralysis of the legs, reaching its maximum in from a few hours to a few days; if complete, there is loss of motion and sensation in the legs and trunk below the lesion, with affection of the bladder and rectum. Corresponding to the level of the lesion, there may be a zone of hyperæsthesia round the body; the upper part of this is supplied by nerves coming off from the upper part of the inflamed area of the cord; the lower limit of the lesion is shown by the superficial reflexes belonging to that part being lost, while those below can usually be obtained.

If the lesion be above the lumbar portion of the cord, the knee-jerks lost at first will return after a few days, and become excessive, ankle clonus being obtainable; also the bladder will not be paralyzed, but will empty itself automatically at intervals, the legs will not markedly waste, and the tendency to bedsores and trophic changes will be less marked. The legs will become stiff and adducted, showing the changes seen in lateral sclerosis.

If the lesion involve the lumbar portion of the cord, the knee-jerks will not return, the bladder will become completely paralyzed, and incontinence, with dribbling, results, the muscles waste rapidly and show the reactions of degeneration, and there will be a tendency to trophic changes wherever there be the least irritation.

Sudden Compression of the Cord, due to dislocation or fracture of a vertebra, gives the same conditions in the paralyzed parts as acute myelitis, and the cause is generally evident on examination of the spine and the history of the case.

Acute Anterior Polio-myelitis, or Infantile Paralysis, commences acutely with fever, often convulsions or a rigor; but this stage may be but slightly marked. Shortly after it is noticed that the child—for children are most frequently affected—has a loss of power in one or more limbs, and there is general hyperæsthesia of the skin, the reflexes of the paralyzed limbs are lost, and the reaction of degeneration is seen in the muscles. There is no loss of sensation or of bladder or rectal control. Later on some of the muscles may regain power, while others waste and contract, producing deformities, and the affected limb

becomes delayed in growth. The parts affected may be one arm or leg only, or both legs, or one arm and one leg—in fact, the distribution is quite irregular.

PARAPLEGIAS OF SLOW ONSET.

With increased knee-jerk: Disseminated selerosis, lateral selerosis. With absence of knee-jerk: Tabes, alcoholic neuritis, Friedrich's disease.

For diagnosis of **Disseminated Sclerosis**, see under the head of Tremor.

Lateral Sclerosis appears about the same age as Disseminated Selerosis, and the motor symptoms in the lower limbs are identical, but there are no sensory symptoms, no arm tremor, and no cranial symptoms.

Tabes, or **Locomotor Ataxy**, is diagnosed by more or less history of pains in the legs, frequently of a sharp character, called 'lightning pains.' Early symptoms are loss of knee-jerk; loss of pupillary contraction to light, though that to accommodation remains; occasionally weakness or loss of sight, due to atrophy of the optic nerve; and perhaps a rapid, painless swelling of some large joint, followed by its disorganization—known as Charcot's joint—or a painless perforating ulcer of the foot. Next comes the change of gait: the leg raised too high, brought down forcibly on the heel, inability to stand with closed eyes or in the dark, and difficulty in turning; later walking becomes impossible, owing to the jerky inco-ordination of the legs. Sensation in the legs may be diminished, and a wooden floor may appear soft and carpeted; there is a loss of muscular sense. There is rarely muscular weakness or wasting till the case is of long standing.

Alcoholic Neuritis may affect both arms and legs, but in slight cases the legs are most affected.

After more or less pain in the legs, with paræsthesiæ, such as 'pins and needles,' etc., the legs get weak and flabby and the gait is impaired; it is weak, the toes are dragged along the ground, and the leg is not raised high enough. The knee-jerk is lost; there may be either numbness or loss of sensation in various parts of the legs or feet, or the skin may be hyperæsthetic; the nerves are usually tender, and so are the calf muscles; the

reaction of degeneration is present in advanced cases; the bladder and rectum are never affected; the patients are nearly always women of middle age.

TREMORS.

Tremors, or twitches of the face or limbs, may be due to many causes:

1. Toxic: Lead, mercury, alcohol, tobacco, morphia, cocaine, etc.

2. Nervous: Occurs in disseminated sclerosis, paralysis agitans, chorea, general paralysis of the insane, in some cases of cerebral tumours, sometimes after hemiplegia, in hysteria.

3. In cases of great general weakness, as seen in continued fevers, especially enteric fever.

4. Senile tremor.

The toxic group may be diagnosed by their other symptoms seen under the head of chronic poisoning.

In **Disseminated Sclerosis** the tremors occur chiefly in the arms on movement, and cease during rest. They may affect the legs, but these usually are simply weak and rigid, with increased knee-jerks and ankle clonus; the tremors do not affect the head and neck. The patient is usually a male between twenty-five and forty-five, and the onset is very gradual, with weakness in walking; the typical gait is 'spastic'—that is, the patient walks very stiffly, placing the toes on the ground first, and on putting the weight on the foot clonus may occur, and the legs may cross each other in walking. There may be some vertigo, but no unsteadiness when the eyes are closed. The arms tremble on movement, the primary movement being overlaid by secondary movements, which increase in amplitude as the movement is continued. There also occurs optic atrophy and nystagmus, and the speech is described as 'syllabic' or 'scanning'—that is, there is an undue separation of syllables.

Tremors of almost identical character to those of disseminated sclerosis may occur in alcoholism, cerebral tumour, and in functional cases; the two former are distinguished by their own special features, and the functional cases by the absence of the optic atrophy, nystagmus, and the characteristic speech.

In **Paralysis Agitans** the patients generally are males between

forty-five and sixty-six, the tremors are fine, occur chiefly during rest, and cease during sleep; they are greatest in the hands and fingers, which are held in a position similar to that of holding a pen, with fine movements, as if a pill were being rapidly rolled between the thumb and fingers; occasionally the same movement is seen in the ankles and feet, and head and neck. The other two chief symptoms are weakness and rigidity, which succeed the tremor; the arms are flexed, the wrists extended, the fingers extended at the proximal joints and extended at the two distal joints, the head and spine are bent forwards, and the face is fixed and expressionless. The patient walks with short steps, but rapidly, as if to prevent himself falling forward; he has difficulty in turning, but can stand well with the eyes shut. The voice is monotonous, there is difficulty in beginning a sentence, but when commenced the words are uttered quickly ('festination').

Reflexes are usually normal.

The tremors of **Chorea** would be better described as 'twitches'—that is, movements of most irregular character and seat. They occur usually first in the hands, face, and tongue, but may attack any striated muscle in the body, including those of respiration, and also the heart; they are accompanied by much loss of power, in proportion to the severity of the movements. Speech is often jerky, and there is mental dulness. The patients are usually children, and endocarditis is a frequent complication, as is also acute rheumatism.

The tremors of **General Paralysis of the Insane** are generally fine, but irregular in rhythm and extent. They are most marked in the lips and tongue, hands and fingers; the disease occurs usually in males of about forty years old. The other diagnostic features are a weakening of the will, a loss of self-restraint, delusions of grandeur and wealth, and a destructive tendency. There may be hallucinations of sight, hearing and taste, the pupils are often irregular or eccentric, and the speech 'slurred' or 'clipped,' as shown markedly by inability to pronounce certain words, as 'truly rural,' 'Biblical commentator,' etc.; the gait becomes uncertain and fits are frequent. Gradually mental and physical weakness becomes more apparent, control over the sphincters is lost, speech becomes unintelligible, and the patient

dies usually about three years from the commencement of definite symptoms.

The deep refloxes may bo inereased, diminished or normal, and sometimes the gait resembles that of tabes or of spastie paraplegia.

Athetosis is the name given to slow, irregular movements whieh oeeur in the paralyzed arm and hand after a hemiplegie attaek; it is most eommonly seen in ehildren. The hand and arm are always more or less rigid.

NUTRITION OF MUSCLE.

Museles may waste generally from malnutrition, or locally from disuse; this latter is markedly seen in the museles aeting upon joints wholly or partially disabled by osteo-arthritis or other long-eontinued joint affections. Also all paralyzed museles waste slowly, as seen in hemiplegia, paraplegias, etc.

But where the nervous lesion involves any portion of the peripheral nerve or its eell in the anterior eornu, the musele to which it belongs wastes to a mueh greater extent; therefore wasting is marked in the tongue of ehronie bulbar paralysis and in the hand and arm muscles of a patient with progressive museular atrophy or syringo-myelia; in these two cases weakness and wasting eome on slowly and at the same time. On the eontrary, in the aeute anterior polio-myelitis of ehildren, and in neuritis, the weakness comes on rapidly with flabbiness, and wasting soon follows.

PERIPHERAL NEURITIS.

The symptoms of neuritis are a gradual onset of paralysis in a eertain group of muscles supplied by one or more nerves; the museles rapidly waste and beeome flabby, and the reaetion of degeneration is well marked. The deep reflexes are lost.

There may be hyperæsthesia or numbness of the skin, which often beeomes smooth, hairless, and more or less devoid of wrinkles, while vesicles or whitlows may appear. The limb, if that be the affeeted part, may feel eold, and the surfaee temperature bo lowered, while the nails may become striated or thin.

There is often pain or tingling in the affected part, and usually also tenderness of the affected nerve trunks. The parts affected are very various.

In alcoholic neuritis the legs are usually first affected, and the paralysis is most marked in them, though the arms may also be paralyzed. The sensory symptoms are usually severe.

In the neuritis of chronic lead-poisoning, the extensor muscles of the wrists and the small hand muscles are most affected.

In diphtheritic paralysis the soft palate is usually first affected, then certain eye muscles, and finally the legs are affected.

The facial nerve is often affected, producing complete paralysis of all the facial muscles of that side; this is called 'Bell's paralysis.'

LEAD-POISONING

causes the following symptoms:

Anæmia, with a brownish, earthy tint of skin.

A blue line may appear on the gums near their margins, especially marked in those who do not use the tooth-brush; if examined with a lens, it is seen to be composed of minute dots, arranged in a row near the edges of the gums.

Constipation is very common, and attacks of colic occur, attended with much griping pain in the abdomen.

Paralysis of the extensor muscles of the wrists may occur, causing 'dropped wrist'; it affects all the muscles of the back of the forearm except the supinator longus; the muscles waste, and show the reaction of degeneration.

The small muscles of the back of the hand may also slowly waste. Occasionally wasting and weakness affect the upper arm muscles, and even the long extensor of the toes and the peronei muscles; the tibialis anticus always escapes.

Cerebral symptoms, as convulsions, delirium, and coma, may be due to lead, and optic neuritis and retinitis occur.

Lead paralysis has to be diagnosed from neuritis due to other causes. Traumatic causes are usually unilateral, with the exception, perhaps, of crutch palsy, in which the cause is evident. Progressive muscular atrophy is much slower in onset, and affects the hand muscles before those of the forearm.

PROGRESSIVE MUSCULAR ATROPHY.

The atrophy begins in the small muscles of the hand as a rule, which gradually waste and become weak, the thenar and hypothenar eminences disappear, and the thumb comes to lie on the same plane with the other fingers; the interossei waste, and the hand often becomes like a bird's claw, the fingers being flexed at the two distal joints, and hyperextended at the metacarpo-phalangeal articulations. Then the atrophy involves the forearm and the biceps and shoulder muscles, the upper portion of the trapezius generally remaining till the last; finally the intercostals and other trunk muscles may become affected, when death soon results.

The affected muscles show marked spontaneous contractions, known as 'fibrillary tremors,' but they do not show the reaction of degeneration. The cutaneous sensibility is unaffected. The legs often remain unaffected, and the bladder and rectum are not paralyzed. Occasionally the wasting begins in the shoulder muscles, and spreads from thence. The patients are, as a rule, young adult males.

The diagnosis has to be made from lead paralysis by the history, the blue line on the gums, etc.; also from syringomyelia, which rare disease much resembles it as regards the slow muscular wasting; but in this disease, though the sensation to touch is normal, there is loss of sensation of pain and temperature.

There is one disease attended by apparent hypertrophy of muscle, called **Pseudo-hypertrophic Paralysis**; it usually attacks several members of the same family. The child is at first noticed to totter in walking, and to have difficulty in getting upstairs; the gait is described as 'waddling.' If the child be placed on its hands and knees, it rises by first extending the knees, pushing itself backwards by its hands, and then placing the hands on the extended legs; it climbs up them, and so becomes erect. The muscles which chiefly become enlarged are those of the calf, the glutei, the extensors of the knees, the deltoids, and the infraspinati; later on the muscles of the spine enlarge and become weak, the result being marked lordosis; and finally the arms and trunk may become

affected. The course of this disease is very slow, extending over many years.

Tactile sensation may be tested by the finger, that to pain by the prick of a pin, and temperature by two test-tubes, one filled with iced and the other with warm water.

In cases of complete myelitis sensation of all kinds may be completely abolished below the level of the lesion; in less complete cases a prick may be felt as a touch; the temperature sense is often lost.

In disseminated sclerosis, tabes, and certain kinds of neuritis, there may be irregular losses of sensation of various kinds, or the sensation may be felt, but be delayed; this is most marked on the lower extremities.

In syringo-myelia there frequently is loss of tactile and temperature sensibility, while that to touch is normal; this chiefly is seen on the hands and forearms.

In hysteria there may be complete hemianæsthesia of one half the body and the limbs of that side, with loss of sight in the eye, and of taste in that half of the tongue. Hemianæsthesia, combined with lateral hemianopia, is due to a lesion involving the optic thalamus of the opposite side.

Hyperæsthesia of the skin is frequent in many fevers, but is most marked in meningitis, or at the commencement of acute anterior polio-myelitis in children.

It is seen locally in many affections of the viscera, and in these cases the patches of hyperæsthesia correspond to the distribution of certain spinal segments.

It is marked in cases of acute myelitis, where it forms a band round the body corresponding to the upper limit of the lesion in the spinal cord.

It is also frequent after, or in the course of, neuralgias or neuritis.

Tenderness of muscles is frequent in neuritis, especially when due to alcoholism; it is also seen in many cases of muscular wasting due to other causes.

Paræsthesiæ, consisting of numbness, tingling, 'pins and needles,' etc., are frequently met with as premonitory symptoms of hemiplegia, etc., and are almost constant in cases of neuritis, especially the alcoholic or gouty forms.

Similar to this is the pain referred to the extremity of a nerve from a part with which that nerve has some connection; for example, the pain of spinal caries, or of an aneurism of the abdominal aorta, may be referred to the front of the chest or abdomen; that of angina pectoris is often referred to the left shoulder or down the arm, etc.

Again, a painful spot may precede the eruption of herpes.

Muscular sense gives one the knowledge of position of the limbs, however placed. To test it, ask the patient to touch the tip of the nose with either forefinger, or to bring them both together with extended arms; if he cannot do this with the eyes closed, there is some loss of muscular sense. To test the legs, grasp one firmly, and move it freely about while the patient's eyes are closed; if he is unable to say whether the knee is bent or straight, then muscular sense is lost.

This sensory loss is very marked in tabes, where it makes the patient unable to stand steadily with closed eyes or to walk in the dark; it is also seen in disease of the central ganglia.

Trophic changes may occur with any lesion of the path in the peripheral nerves, cord or brain of those fibres subserving nutrition; thus, they occur to some extent in nearly all paralyses; but in those where the cells of the anterior cornua of the spinal cord are alone affected it consists solely of muscular wasting. The other trophic changes are increased sweating, œdema of the subcutaneous tissue, blistering or sloughing of the skin, striation or atrophy of the nails, blue smooth skin, loss of hair, occasionally, also, chronic joint effusions.

Allied to the preceding is the vaso-motor change, when the affected part may be considerably warmer or colder than the rest of the body.

Nerve tenderness can be examined in the ulnar and median of the arm and the brachial plexus and nerves, in the sciatic and popliteal nerves of the leg, and the points of exit of the various branches of the 5th cranial nerve, etc.

Tenderness of the nerves is generally dependent on a neuritis, and at the places where the nerves emerge from bony or membranous canals they are usually most tender.

Reflexes.—These depend on the integrity of the cord and

nerves in the part to which they correspond, also upon their connection with the brain.

The superficial reflexes are obtained by a sharp stroke of the finger over certain parts of the skin. They are:

(*a*) Plantar reflex is a flexion of the ankle and toes, and, if excessive, also flexion of the knee, produced by tickling the sole of the foot; it depends on the integrity of the 1st, 2nd, and 3rd sacral nerves and adjacent part of the cord.

(*b*) Gluteal reflex is a contraction of the muscles of the buttock, produced by irritation of the skin of the back of the thigh; it depends on the integrity of the 4th, 5th, and 6th lumbar nerves and cord of this region.

(*c*) Cremasteric reflex is a retraction of the testicle, produced by tickling the inside of the thigh; for its production the 1st, 2nd, and 3rd lumbar nerves must be intact, and the cord of this region.

(*d*) Abdominal reflex is a drawing of the umbilicus to the side, which is irritated by stimulating the iliac region; it depends upon the 8th dorsal to the 1st lumbar nerves, with the included cord.

(*e*) Epigastric reflex depends upon the 4th to the 7th dorsal nerves, and is a drawing of the umbilicus to the side, irritated by stimulation of the skin just below the costal margin.

(*f*) Scapular reflex depends upon the nerves and cord from the 5th cervical to the 1st dorsal nerves, and consists of a movement of the scapula produced by stimulation of the skin.

Gait.—This should be observed where possible in all nervous cases.

(*a*) In spastic paraplegia or disseminated sclerosis, the legs are stiff, the toes catch on the ground, the legs are too strongly adducted, and may even cross, and on putting down the foot clonus may occur (spastic gait). This is seen when there is a sclerosis of the lateral columns of the cord. The toes of the boots are worn out first.

(*b*) In tabes the feet are raised too high and thrown too far forwards, brought down too suddenly, and the heel comes to the ground first. The heels of the boot are worn out first (ataxic gait).

(*c*) Peripheral neuritis: The legs drag behind the patient, and all the muscles appear limp (halting gait).

(*d*) Pseudo-hypertrophic paralysis: The legs are too wide apart, and the patient rolls from side to side (waddling gait).

(*e*) Cerebellar gait: The feet are placed too wide apart; the gait is described as 'reeling.'

(*f*) Hemiplegia: One leg is stiff, and the foot is brought down clumsily on the outer side (halting gait).

Reaction of Degeneration.—In cases where there is a lesion involving the cells of the anterior cornu of the cord, or the motor nerve with which it is connected, the reaction of degeneration occurs after a lapse of some days. Normally the muscles contract to the faradic and galvanic current, and to the latter current the contraction starting from the cathode when the current is started produces the most marked effect (cathodal closure contraction—CCC).

If the nerve is undergoing rapid degeneration, as in the case of a lesion like the above-mentioned one, the contraction to faradism becomes less marked, and finally lost, while the contractions to galvanism become for a time excessive, the muscle contracting with a current so weak that a healthy muscle would be unaffected by it. Also the cathodal closure contraction does not occur so readily as the anodal closure contraction. The strength of current necessary to produce contraction starting from the cathode is greater than that which will produce a contraction starting from the anode.

After a lapse of many weeks, if the nerve injury be permanent, the contraction to galvanism gradually becomes less, and finally no strength of current will produce a contraction in the degenerated muscle.

The most typical examples of tho reaction of degeneration are found in the muscles paralyzed by peripheral neuritis or acute anterior polio-myelitis.

CHAPTER IX.

DISEASES OF THE JOINTS AND BONES.

To examine a joint, it should be bared and compared with the one on the opposite side, and any alteration of contour noticed; this may be due to morbid material in or outside the joint. If there be intrasynovial fluid, fluctuation may be conveyed from the fingers of one hand to those of the other when pressed upon the outlying skin. The joint may be moved to examine for grating on movement. The condition and colour of the skin over the joint should be noted.

Pain due to disease in a joint may, as elsewhere, be referred to the extremity of a nerve connected with that joint, and hence pain due to disease of the hip-joint may be referred to the knee.

ACUTE RHEUMATISM

affects usually persons under thirty-five; two or more joints are usually affected. The onset is acute, with pain, swelling and excess of fluid in the joint, which is generally one of middle size, such as the ankle, wrist or elbow; the overlying skin is shiny, bright red, but does not pit on pressure, and no dilated veins are seen. The pain and swelling usually fly rapidly from one joint to another. Other symptoms are pyrexia, as a rule over 102°, but depending largely on the administration of salicylates; pulse is full and rapid, tongue covered with a thick white fur, and there is copious sweating, the skin often being covered with sudamina or with various erythematous eruptions. There is also a frequent endocarditis, or inflammations of the pericardium or pleuræ.

Rheumatic nodules, or small masses of fibrous tissue over subcutaneous bones or tendons, are often seen in young patients.

GOUT

generally occurs in patients over thirty-five, and is frequent in the subjects of lead-poisoning. It chiefly attacks the smaller joints, especially the metatarso-phalangeal articulations of the great toes. The onset is usually in the early morning about two

or three o'clock, with severe pain in the affected joint or joints, lasting till morning, when it remits to some extent, leaving the joint swollen and painful. The joints are usually swollen, and the skin deep red, tense and shining, with distended veins and pitting on pressure; after the attack it usually desquamates. In a more chronic case the joints attacked are more numerous and the pain more continuous, though always worse by night. The pyrexia depends on the number of joints involved, and not on the treatment. There is usually little perspiration except, perhaps, by night. There is no erythema of skin, but sometimes an eczematous eruption. The heart is not affected.

There is frequently some trace of albumin in the urine, which is high-coloured, very acid, and depositing abundant urates.

In cases of some standing there are frequently tophi of urates of soda in the lobules of the ears, bursæ near joints or over the joints themselves; these are hardish nodules, which may burst through the skin and discharge.

OSTEO-ARTHRITIS

may affect one or many joints, in the first case generally choosing a large joint, as the hip, shoulder, etc., in a male, and in the latter often affecting the small joints of the hands and feet in a young female. It comes on slowly with dull aching in the joints, which slowly enlarge and crack on movement, and at times may become distended with fluid.

The pain is fairly constant during an attack, but is generally worse at night. The joints rarely show any redness of the covering skin, and there is no fever or profuse sweating. The muscles round the affected joints waste considerably, and finally the joints may be more or less fixed from the bony deformity or anchylosis of the joint. Many of these patients show exostoses coming from the neighbourhood of the joints, especially of the fingers, which are called Heberden's nodes.

PYÆMIC ARTHRITIS

much resembles acute rheumatism if it come on without obvious external wound. There is considerable pain and swelling of certain joints, but as a rule the inflammation does not leave the

joints first attacked. The joints are swollen from fluid within them, the skin is often glazed, dusky red, and may pit on pressure, and occasionally blisters form. Later there may be a grating as of bare bone within the joint, or a burrowing and pointing of an abscess connected with the joint. In these acute cases the temperature is frequently high, above 104° or 105°, and the patient sinks into a semi-conscious dull state, with dry brown tongue and sores on the lips, in which condition he or she usually dies.

In young patients suffering from gonorrhœa or gleet, the joints may become swollen and tender, and there may be considerable effusion; the pains do not fly from joint to joint as in acute rheumatism, but are fixed to the joints attacked (usually the medium-sized ones), till either they subside, leaving the joint movable, or cause erosion of the cartilages and a subsequent anchylosis. The fever is but slight as a rule, and there is not the marked sweating of acute rheumatism; the diagnosis has to be made chiefly from the presence of the urethral or vaginal discharge.

TABETIC JOINT DISEASE,

commonly known as 'Charcot's joint disease,' usually affects the knees, elbows, shoulders, etc., as a rule attacking only one joint at a time. The joint is rapidly distended with fluid, the joint structures become disorganized, so that the ends of the bones may knock together and the limb may be bent into any position. This disease is painless throughout. There is some resemblance to osteo-arthritis, but the other symptoms of tabes, such as loss of knee-jerk, inco-ordination, Argyll-Robertson pupil, and optic atrophy, mark the distinction clearly enough.

TUBERCULAR ARTHRITIS

usually occurs in young subjects, and affects one joint only; the onset is slow, with slight pain on movement, and obscure swelling without fluctuation, but giving a doughy feel to the joint. Complete flexion and extension cause pain. Later on, if not interfered with, an abscess may form. The slow and insidious onset, affecting only one joint, is a distinction from those cases of osteo-arthritis occurring in young subjects.

RICKETS

is a disease of infants between six months and two years of age. The signs are: An enlargement of the epiphyses of the long bones, marked in the wrists and ankles, with later a bending of the shafts of the bones, enlargement of the junction of the ribs with their cartilages, a flat, square-shaped head, with late closure of the fontanelles. (The anterior fontanelle should be closed at from eighteen months to two years of age.) There is retardation of the growth and a late appearance of the teeth.

Normally the teeth appear at the following ages:

2 lower central incisors	...	7th to 9th month.
2 upper central incisors	...	9th to 11th month.
2 upper lateral incisors	...	10th to 12th month.
2 lower lateral incisors	...	12th month.
4 front molars ...	...	14th month.
4 bicuspids ...	...	18th to 20th month.
4 second molars ...	...	about two years.

The above figures are of course approximate, but a child of a year old should have between eight and twelve teeth.

Symptoms occurring in connection with rickets are: Attacks of vomiting and diarrhœa, bronchitis and other lung affections, which cause a bending of the lower ribs and projection of the lower part of the sternum—the so-called 'pigeon-breast'; fits also are frequent.

Rickets may be confounded with hydrocephalus, owing to the enlarged head; but in hydrocephalus the head is rounded, and the eyes depressed in the sockets.

MOLLITIES OSSIUM

is a rare disease, chiefly attacking women who have had numerous pregnancies in a short space of time. The bones become soft, and bend or break easily, causing complete helplessness and much deformity.

OSTEITIS DEFORMANS

occurs usually in persons over middle age; it affects both sexes. The long bones are most usually and most severely affected, but the cranial bones, the vertebræ and pelvis, may also be diseased. It begins with aching pain in the affected bones, which gradually

increase in size; the long bones become thicker, but not longer, while those of the legs show marked bending in the direction of their natural curvature. The disease is very chronic, bone after bone becoming affected; but intervals of arrest of the disease occur, followed by fresh intervals of pain and enlargement.

ACROMEGALY

is an uncommon disease affecting adults, usually males. The hands and feet enlarge, as do the bones of the face, especially the lower jaw. The enlargement is due to growth of both bones and subcutaneous tissues. The tongue is sometimes also enlarged. Frequently there is also impairment of vision, due to double temporal hemianopia.

CHAPTER X.

DISEASES OF THE BLOOD.

Examination of the Blood.

As a preliminary, the tint of the skin and mucous membranes as of the lips and conjunctivæ, should be noted.

After placing a bandage round a finger, it may be pricked, and the blood examined.

(*a*) Colour may be pale in anæmias, look as if mixed with milk in leuchæmia, bright pink in poisoning by carbon monoxide, or chocolate-coloured in poisoning by nitro-benzole.

(*b*) Number of corpuscles may be estimated by Gower's Hæmocytometer. Five cm. of blood are measured by a pipette, and mixed with 995 cm. of normal saline solution; a drop of this is placed on a slide ruled with cross-lines, distant from each other 0·1 millimetre, the cell of the slide being 0·2 of 1 mm. deep; the cell is covered by a cover-glass, and the number of red and white corpuscles counted in 10 squares; this, multiplied by 1,000, gives the number in 1 cubic millimetre of blood.

The normal average per cubic millimetre is 5,000,000 in males, and 4,500,000 in females, and of white corpuscles there should be 1 to each 300 red, except after a meal, when the white corpuscles may be much increased in number.

(*c*) Amount of hæmoglobin : 20 c.c. of blood is measured by a pipette, and placed in a moistened, graduated tube; water is added till a tint be obtained like that of a similar tube containing a standard tint; then the level of the blood and water in the tube shows by the graduations the percentage of hæmoglobin in the blood (Gower's Hæmoglobinometer). By comparing these results with the former, it can be seen whether the defect be in the number of the corpuscles, or in a deficiency of the hæmoglobin they contain, or whether both are affected.

(*d*) A cover-glass should be moistened with blood, and examined freshly under the microscope.

The red blood corpuscles may be pale, due to diminished hæmoglobin, altered in shape, crenated, or mulberry shape. Some red corpuscles may be much smaller than usual—'microcytes'; this is seen in all forms of pronounced anæmia, but they are most numerous in pernicious anæmia. 'Macrocytes' are corpuscles much larger than natural; they are specially seen in pernicious anæmia, but occasionally some are found in other kinds of profound anæmia.

Nucleated macrocytes are specially seen in pernicious anæmia.

Poikilocytes are red corpuscles of altered shape, seen specially in pernicious anæmia, but sometimes found in anæmias of other origin.

The white corpuscles are of various shapes, and some showing more than one nucleus even in health. Normally, there should be about 1 white corpuscle to 300 red corpuscles; they are increased in number after meals, in all fevers and hydræmic conditions of the blood.

In leuchæmia there is an immense increase of the number of the white corpuscles, which may sometimes be equal or greater in number than the red cells; they vary markedly in size and in the number of their nuclei, and octahedral crystals may sometimes be seen in the blood.

Eosinophilous cells are those containing granules which stain with an acid solution of eosin.

In melanæmia, which may be part of the malarial cachexia, the blood contains brownish-black granules, either free in the blood or in the white corpuscles.

(*e*) A cover-glass may be spread with a thin film of blood,

dried, and passed through a flame, and then examined, stained or unstained, for micro-organisms. The commoner micro-organisms are—

(i.) Malarial parasites may be found in patients during the time of a febrile paroxysm, either free in the blood or in the red corpuscles. It is well stained with watery methyl blue, while the corpuscle may be stained with eosin if desired. It is of raised form, probably representing different stages in development of the individual organism.

(ii.) Tubercle bacillus may be found in the blood in cases of miliary tuberculosis; it is stained for in a similar way to the sputum.

(iii.) In relapsing fever a spirillum about three times the length of a red corpuscle is found in large numbers in the blood during the febrile periods.

(iv.) In splenic fever a large bacillus as long as a blood cell is found; it may be well stained by fuchsin.

(*f*) Animal parasites.

The young of the *Filaria sanguinis hominis* may be found in the blood of affected persons during the night; their length is about that of a white corpuscle; they show active movements, and are surrounded by a delicate outer membrane; their shape is that of a thread.

ANÆMIA

—that is, poorness of blood—is but a symptom of some underlying cause. A classification of anæmias is the following:

I. **Secondary Anæmia**, due to—

(1) Acute or chronic disease.

(2) Loss of blood; this may be sudden or gradual, as that due to bleeding piles, excessive menstrual flow, or to the *Anchylostomum duodenale*.

(3) Over-lactation.

(4) Loss of pus or other discharge.

(5) Deficient or improper food, or absence of light and air.

II. **Chlorosis.**

III. **Idiopathic Anæmia (Pernicious Anæmia).**

The diagnosis of anæmia is made on the following grounds: The patient's mucous membranes are pale, as seen in the lips

and conjunctivæ; she—for women are most frequently affected—is breathless on exertion, and suffers from palpitation and frontal headache, and swelling of the legs and feet. If a drop of blood be drawn, it is seen to be pale and watery-looking, and is found to be deficient in red cells and hæmoglobin, as mentioned above. Various hæmic murmurs, systolic in time, are heard at the pulmonary cartilage, at the heart's apex beat, along the arteries, and also various hums over the neck, as mentioned under examination of the circulatory system.

The diagnosis between chlorosis and secondary anæmia is chiefly by exclusion of a cause, and this is not always easy, especially in women who may not volunteer a history of piles, or who may consider a menstrual discharge once a fortnight a normal occurrence. If the blood be examined in secondary anæmias, it is seen to be deficient in both hæmoglobin and corpuseles; but each red corpusele retains its normal amount, while in chlorosis the red corpuscles are nearly normal in quantity, but deficient in hæmoglobin.

Pernicious anæmia is diagnosed by the exclusion of a cause for a long-continued anæmia which does not yield to remedies. The chief difficulties are in excluding deep-seated malignant growths, or Addison's disease, which may occur without pigmentation—at least, for a long period—or slow intestinal bleeding from the Anchylostomum or other parasite.

It usually attacks males, often between thirty and forty; its special characteristics are an irregular moderate fever, and the occurrence of hæmorrhages into the retinæ and from the mucous membranes.

ADDISON'S DISEASE

usually occurs in males between twenty and fifty years of age. The first symptom is usually progressive asthenia, so that the patient takes to bed from weakness, and may faint on sitting up. The heart's action is weak and the sounds faint, and the pulse small and compressible. There is dyspnœa and frequent yawning. With this nausea and vomiting frequently comes on.

Pigmentation is the third marked symptom; it occurs in the following parts: (i.) Those exposed to the air, such as the face and hands; (ii.) parts exposed to pressure, as round the waist or where garters are worn, etc.; (iii.) parts where pigment is normally marked, as the axillæ and groins, nipples, and a line from the pubes to the umbilicus; (iv.) bluish-black patches like inkstains upon the inside of the cheeks; (v.) excessive pigmentation of moles or round scars.

The disease is usually diagnosed by the presence of the three groups of symptoms mentioned, and by its character in spite of treatment.

It is apt to be mistaken for ordinary anæmia in persons with naturally dark skin, or from the cachexia produced by malignant growths, the site of which may not be obvious.

Pigmentation of the skin, especially of the forehead, is frequently seen in cases of uterine or liver disease or malarial fevers.

SCURVY.

The face is sallow and anæmic, and the patient very weak and prostrate, occasionally suffering from faintness and dyspnœa on exertion. On the skin a purpuric eruption appears round the hair follicles, with occasionally larger hæmorrhages under the skin, and deep fasciæ, which form brawny indurations which are very tender. The gums become bluish, spongy, and detached from the teeth; they are tender and bleed easily, the teeth may drop out, the breath is very fœtid, and the tongue flabby and coated. Blood may come from the nose and stomach. The sight may be deficient at night.

The diagnosis is made chiefly by the knowledge of a cause in the shape of insufficient fresh food and the combination of the condition of the gums with the purpuric eruption, and the beneficial effects of treatment.

HÆMOPHILIA

commences to show itself about the second year of life. It is characterized by the occurrence of hæmorrhages occurring without adequate cause. These may be from a scratch or a tooth extraction, or occur deeply under the skin or into the joints.

This disease appears much most frequently in males, and is hereditary, being usually transmitted through the female line. The diagnosis is usually determined by the family history.

CHAPTER XI.

SKIN DISEASES.

In the diagnosis of skin diseases, the following points should be ascertained before examining the rash, viz.: the duration and course of the eruption, whether it appeared all at once or in crops, and whether it has been or is spreading; if it was attended by any symptoms, such as itching, malaise, fever, etc., and if any cause can be given.

Then the rash should be examined, and it is most important to see all the affected parts; there can then be seen the distribution and extent of the rash, whether it is symmetrical or not, and whether the lesions are uniform (viz., all of the same character) or multiform.

Then the character of the eruption must be made out.

1. Is it a simple redness of the skin which fades for a moment on pressure? This is erythema.

2. Is there an inflammation affecting the skin more or less deeply, forming patches, as in erythema nodosum, urticaria, eczema, psoriasis, dermatitis exfoliativa, etc., or forming papules, as in lichen ruber, or vesicles, as in herpes zoster, etc., and pemphigus, or pustules, as in impetigo contagiosa, boils, carbuncles, etc.?

3. Is there a chronic thickening of the skin, as in scleroderma, elephantiasis, etc.?

4. Does the disease especially affect the appendages of the skin, as the sebaceous glands in acne, the hair follicles in alopecia, sycosis, tinea tonsurans, etc.?

5. Is the eruption multiform, as seen especially in syphilitic eruptions?

6. Is there much sign of scratching, as is seen markedly in scabies, pediculi, etc., and to a less extent in urticaria, etc.

It will be as well here to give a short definition of the lesions of the skin met with.

1. **Maculæ** are discolorations of any size or shape not raised above the level of the skin.

2. **Papules** are small elevations of the skin not containing blebs of fluid.

3. **Vesicles** are small elevations of the skin containing a clear fluid.

4. **Bullæ** are similar to vesicles, but larger in size.

5. **Pustules** are like vesicles, with the exception that they contain pus.

ERYTHEMA.

This is a simple redness of the skin which disappears on pressure; it occurs on various parts, dependent on its causation, which may be friction of clothing, and especially of new flannel; or friction of two surfaces, as under the breasts of women or the groins and buttocks of children; or irritants of the skin, as mustard, sulphur, mercury, etc. On the buttocks in children it has to be distinguished from the eruption of congenital syphilis, but this latter is not confined to the napkin; ulceration is often present, and patches of eruption may have healthy skin between them.

Irritation of the stomach or intestine, especially in children, may produce patchy redness of the face, soon disappearing. Erythema on the breast or elsewhere may have to be diagnosed from the eruption of scarlet fever, which it may much resemble; this is chiefly done by the accompanying symptoms of scarlet fever, as sore throat, vomiting, etc.

Erythema Multiforme is an erythema in patches of varied shape and size, often very slightly raised, chiefly coming out on the limbs and backs of the hand and feet, but frequently affecting the trunk also. It appears as small spots enlarging peripherally, and fading in the centre, so forming rings, some of which may coalesce, forming gyrate curves (hence the names papulatum, circinatum, gyratum, etc., used to describe these various appearances). This eruption is of frequent occurrence in rheumatic patients, and is generally attended by slight fever and pain, and swelling of certain joints.

Erythema Nodosum usually occurs in young adults, and especially those of a rheumatic tendency. It forms raised spots

like nodes about an inch in diameter, symmetrically distributed over the tibiæ; they are tender, and at first bright red, but soon get dusky, then fade like a bruise. There are usually about two or three on each leg, and they fade in about a week; but sometimes a fresh crop appears. This is often attended with rheumatic symptoms, as tonsillitis or joint inflammation, etc.

URTICARIA

is an asymmetrical eruption, very irregular in position and amount, varying from one or two spots to a rash covering nearly the whole of the body; it is frequently accompanied by symptoms of gastro-intestinal derangement.

The lesions of the skin are like those produced by the stinging-nettle, being flat raised elevations about $\frac{1}{2}$ inch in diameter, at first red, and later becoming white. They last from one to twenty-four hours, and are accompanied by excessive itching. If on the face, they may be accompanied by much œdematous swelling.

ECZEMA

is the most common of all skin eruptions; it begins acutely, but may last a very variable time. It is always symmetrical, and is most common where the skin is thin, as the flexor aspect of the limbs behind the ears, etc. It consists of a congestion of the skin with, in most cases, minute vesicles, which soon rupture and form a scab, under which often is a clear fluid which stains and stiffens linen. There is smarting and itching.

The more chronic form may show no discharge, but only irregular red patches with fine scales over them, and on pinching up the skin it will be felt to be thickened.

The diagnosis has to be made from—

1. Scabies. This chiefly affects the hands, and with care burrows containing the acarus may be found. The irregularity of the eruption, especially occurring on the hands, feet, wrist, pubes, etc., is characteristic of scabies.

2. Impetigo contagiosa, occurring on the occiput of children, and generally due to *Pediculi capitis*, is distinguished from eczema by its situation and the presence of the eggs on the hairs.

3. Psoriasis may be mistaken for dry eczema, but psoriasis

occurs chiefly on the extensor aspect of the limbs, especially over the olecranon and patella. There is never any history of moisture. The edge of the patch is sharp, and the scales are dry, heaped up, and crusted, and when picked off leave a dry, hyperæmic surface.

4. Tinea circinata is distinguished by its asymmetry and by its spreading at the edges, while its centre clears up.

IMPETIGO CONTAGIOSA

is an asymmetrical, scattered, pustular eruption, occurring in children chiefly on parts which can be scratched, as on the lower part of the face, the occiput, and the hands and fingers. The pustules may rupture and become covered with a scab. In children the cause is usually *Pediculi capitis* or *corporis*.

HERPES ZOSTER

consists of a group of small vesicles on an inflamed base, occurring in the course of a cutaneous nerve. It is asymmetrical, and is frequently accompanied with pain. It is most common on the trunk or face and neck. If on an intercostal nerve, there is often a patch near the spine, one in the axilla, and one near the middle line in front, corresponding with the cutaneous divisions of the affected side.

PEMPHIGUS

consists of scattered bullæ—*i.e.*, large vesicles—from $\frac{1}{4}$ to 1 inch in diameter, which form more or less symmetrically on the face, trunk, and limbs. They come out in crops, each bulla lasting a few days only; but a succession of crops of bullæ may cause the disease to linger for weeks or months. There may or may not be slight fever.

PSORIASIS

is a very common eruption; it occurs especially and is most characteristic on the extensor surface of the limbs, especially the elbows and knees, the scalp and trunk. It consists of patches of various size with sharply-defined edges. It is covered more or less with whitish scales, which, peeled off, leave a red hyperæmic skin; it is symmetrical, always dry,

and itches more or less; it is rare on the palms and soles; it may be mistaken for—

1. Eczema. The diagnosis is given under eczema.

2. Pityriasis rubra, which is generally universal, and comes on rapidly all over the body; the scales are finer than those of psoriasis, and never form crusts, but come off very readily.

3. Syphilitic eruptions. These favour especially the flexor surfaces, and are always small, with few scales, and of a brownish, coppery colour, and with them are the other symptoms of syphilis, as sore throat, iritis, etc., in the secondary syphilide, while the tertiary syphilides attack the face more often than psoriasis, and leave more distinct pigmentation.

PITYRIASIS RUBRA, OR DERMATITIS EXFOLIATIVA,

comes on suddenly, soon involving the whole surface of the body, as a red scaly eruption. The scales rub off easily, and never form crusts, as in psoriasis; the skin is not thickened, and there is no discharge, but the whole surface of the skin appears uniformly red, and the clothes or bed contain a large quantity of fine cast-off scales. The amount of constitutional symptoms is very variable.

LICHEN RUBER,

also called lichen planus, consists in aggregations of flattened papules with angular edges, closely applied to each other, of a purplish colour. They are symmetrically placed, usually on the flexor aspect of the wrists or the knees; they itch slightly, and the course is very chronic.

If very closely aggregated, they may resemble chronic eczema or psoriasis; but characteristic angular papules are usually seen near the patch of lichen, which differ markedly from these other two eruptions.

ERUPTIONS PRODUCED BY DRUGS (DERMATITIS MEDICAMENTOSA).

The following are the more usual ones:

Bromides produce a kind of acne consisting of small pustules, chiefly on the face and trunk, coming out in crops, and often persisting after the discontinuance of the medicine.

Copaiba produces an erythema rather like scarlet fever, chiefly on the extremities and abdomen.

Iodides may produce erythemata, pustules, or purpuric eruptions.

Belladonna externally applied may produce an itching, erythematous rash, or even small papules, on the part to which it is applied.

Antipyrin, chloral hydrate, etc., may produce a fleeting erythematous eruption.

PURPURA

is hæmorrhage into the skin. These hæmorrhages form flat spots, varying in colour between red and purple; they are not raised, and do not disappear on pressure; they are bilateral, and usually occur on the legs; they come out in crops, last a few days, and disappear like an ordinary bruise.

In some cases of greater severity this eruption appears on other parts of the body, and hæmorrhages from the various mucous membranes, as nose, stomach, urinary organs, etc.

Purpura occurs in certain fevers, especially cerebro-spinal meningitis, and occasionally measles, small-pox, etc. It occurs in many other blood alterations, as septicæmia, rheumatism, etc.; it may result from the administration of certain drugs, as iodides, quinine, belladonna, mercury, etc. It occurs in scurvy, hæmophilia, leuchæmia, anæmias, scurvy-rickets, chronic Bright's disease, etc., also in the excessive weakness of long-continued disease, as cancer.

SYMMETRICAL GANGRENE (RAYNAUD'S DISEASE)

occurs usually in adult women, after exposure to cold. It attacks, as a rule, the fingers, toes, or ears, though other parts may be affected. There are three varieties:

1. **Local Syncope.**—The affected parts become white like wax, and cold, and are numb, with tingling or severe pain, and after a few minutes or a few hours recover.

2. **Local Asphyxia** may succeed the local syncope, the part becoming livid and very painful; this may pass off, or may cause—

3. **Gangrene** of the part affected, which is like any other dry gangrene, but is usually superficial.

These various maladies may come on paroxysmally, lasting through a portion of each winter. Some of these patients are the subjects of hæmoglobinuria.

LUPUS ERYTHEMATOSUS

occurs chiefly in young adult females, and most commonly symmetrically on the nose and cheeks, beginning as small red scaly spots connected with the sebaceous glands; these extend, and coalesce into red scaly patches, showing plugs in the enlarged sebaceous follicles; finally the central part forms a scar, which gradually becomes whitish, while it spreads at the edges very slowly. No ulceration is present.

It may be mistaken for psoriasis, but this is generally present also on the characteristic places on the limbs. Eczema has a less defined edge, there are no plugs dipping into the sebaceous follicles, and this disease usually improves considerably—at least, for a time.

LUPUS VULGARIS

is a chronic disease which begins first in a child, usually on the cheek or nose, as small red papules, which slowly increase in size, and finally coalesce to a raised reddish patch covered with a slight scale. This extends slowly at its edge and also in depth, destroying soft parts, and even nasal cartilages; finally the central part may cicatrize, while it still extends at its edges. It occurs also on other parts, but much less frequently.

The diagnosis is made chiefly from the presence of the small tubercles, which have a translucent appearance, combined with slight scaliness and the scarring, and its slow extension.

Syphilitic gummata ulcerate more rapidly, with offensive secretion, and nearly always occur in much older persons.

Epithelioma begins in older persons, is painful, and has a raised hard edge round the central ulcer.

ACNE VULGARIS

occurs chiefly in young persons, and especially on the face and trunk. It is bilateral, but not truly symmetrical, and

consists in an inflammation of the sebaceous glands, sometimes forming pustules on the surface of the skin—sometimes deeper indurated masses about the size of a pea or bean, which if pricked will discharge pus and sebaceous material. The lesions appear in crops for a very indefinite period. It may be mistaken for small-pox, but the absence of constitutional symptoms should be diagnostic. Acne may be produced by the administration of drugs, notably bromides and iodides, as before mentioned.

ACNE ROSACEA

occurs chiefly in adult women of alcoholic habit, or suffering from chronic dyspepsia. It occurs on the face, first as a temporary congestion of the skin, which finally becomes permanent, with dilated vessels, and frequently hypersecretion from the sebaceous ducts; later papules and pustules may appear. It may be mistaken for lupus erythematosus, but in this there is some scaliness and scarring, and a more defined edge.

BOILS

are so well known that the diagnosis is easy. They begin round a skin gland as a raised red spot, which soon softens in the centre and breaks through the epidermis, pus and necrosed tissue coming away, after which the ulcer remaining soon heals. The chief point about them is always to test the urine of the patient, as they are very frequent in diabetes mellitus.

CARBUNCLES

are much larger, flatter, and harder than boils, and may cause much sloughing of the tissues and gangrene of the overlying skin. There is much pain. The centre of the mass softens, and from numerous points pus may escape to the surface, while, if it be not treated, the inflammation may extend widely beneath the skin.

SYPHILITIC ERUPTIONS

are exceedingly numerous; they are diagnosed partly by their characters and partly by the accompanying symptoms and lesions.

1. **The secondary eruptions** are symmetrical, and affect

chiefly the forehead, chest and abdomen in front, and the flexor surfaces of the limbs, including the palms and soles. A few days after their appearance they tend to become brownish or copper-coloured, and ultimately stains may be left. The variable character of these eruptions is of diagnostic value, also the absence, as a rule, of pain or itching; their course is slow, and they tend to recur.

The lesions may be erythematous, or consist of scaly papules, the scales of which are never so numerous as in psoriasis, and which may form flattened raised patches of various sizes. Occasionally even vesicles and pustules form at this stage.

2. **The tertiary eruptions** are generally limited in area and non-symmetrical, occurring as a rule on the face and scalp, the palms and soles, or the upper part of the leg. They usually leave scars, which are pigmented, and often depressed. They are of the following kinds:

Rupia, which, beginning as a bulla, soon becomes pustular, then covered by a scab, which gets more and more elevated and larger at its base, and looks like a limpet-shell; beneath this the skin is ulcerated; the lesion spreads, and may produce a characteristic serpiginous scar, deeply pigmented.

Gummata of the skin form raised lumps of a coppery colour, and about $\frac{1}{2}$ inch in diameter, with a scaly surface. They may break down and leave ulcers, and finally scars.

A scaly papular eruption frequently appears on the forehead or flexor surface of the limbs, and is not uncommon on the palms and soles, where, owing to the peculiarities of the part, the skin may appear as if pecked out; and painful fissures are often present.

3. **Congenital syphilitic skin eruptions** commence usually within the first three months after birth. They are accompanied by wasting and anæmia, etc.

The first eruption is usually an erythematous one on the buttocks and round the anus, liable to be mistaken for the intertrigo of uncleanliness; but it is patchy, and often extends beyond the limits of the napkin, and there is generally some scaliness or desquamation of the surface.

Mucous tubercles, or raised, flattish, reddish patches, occur often near the mouth and anus, and in the groins and axillæ.

A scaly papular eruption may be present all over the body. Pemphigus sometimes appears on the palms and soles of children during the first week after birth; these children are always very cachectic, and the diagnosis is simple.

ELEPHANTIASIS

is most common in men, and usually affects the leg or scrotum. The part is enormously enlarged and hard, with a firm œdema, sometimes showing varicose lymphatics; there is often some pigmentation of the part, and occasionally warty growths form. The cause in this country is usually recurrent attacks of erysipelas, but in the endemic cases occurring in the East it is due to the *Filaria sanguinis*.

ICHTHYOSIS, OR ZERODERMA,

is a congenital condition of extreme dryness of skin, accompanied by development of roughness, scales, or small papules covered by a horny growth.

The diagnosis is easy, owing to the fact that it is always congenital.

TINEA VERSICOLOR,

also called pityriasis versicolor or chloasma, occurs in both sexes after the age of twenty. It usually affects debilitated persons. It forms light brown patches or tracts, mostly on the trunk; the patches are very slightly raised and slightly rough, can be scraped off by the finger-nail; a portion of this put on a slide, and treated with liquor potassæ, shows under the microscope the spores and mycelium of the *Microsporon furfur*.

TINEA CIRCINATA

begins as a small, pale, circular spot, becoming scaly and spreading, while the centre clears up; it thus forms a ring. It is common on exposed parts of the skin. It is asymmetrical, and generally only one or two patches are present. Its appearance as a scaly, spreading ring is very characteristic.

TINEA TONSURANS, OR RINGWORM,

is an exceedingly common disease. It begins as a papule round a hair, which becomes scaly and spreads. The hairs break off, and a grayish, dirty-looking patch is left, on which are seen the stumps of the broken hair. Some of these, pulled out and put on a microscopic slide with a drop of liquor potassæ, will show that they are infiltrated with the mycelium of the fungus *Trichophyton tonsurans*.

In some cases this use of the microscope is essential for a diagnosis, as the following diseases may be mistaken for it:

In seborrhœa of the scalp the scaliness is diffuse, the loss of hair is slight, and there are never any broken stumps.

Psoriasis of the scalp is generally accompanied by eruptions elsewhere which may be typical. The scales on the scalp are more numerous, and there is rarely any loss of hair.

Eczema from scratching may resemble ringworm, or ringworm may resemble eczema, but the loss of hair and the scattered patches of ringworm, with the short, broken stumps of hair, should suffice for a diagnosis.

ALOPECIA AREATA

may affect any part of the body covered with hair. It begins on the scalp, as a rule, the hair gradually falling off and leaving round smooth patches, at the edges of which may be seen short hairs, which, when pulled out, are seen to be thinner at the root than at the free end. The diagnosis is chiefly from ringworm, in which the short hair stumps are broken and twisted and the surface of the patch scaly, and always showing some broken hairs.

SCABIES

consists in irregular lesions, chiefly on the hands, wrists, or genitals, or their neighbourhood. The eruption is scattered, and may be papular, vesicular, or pustular, but here and there may be seen the characteristic burrows of the female insect. These form an irregular line, as a rule, blackish in colour, at the end of which is the acarus, which, when the burrow

is broken open, clings to a needle inserted near it, and may be placed on a microscopic slide and examined. This is rounded, and has eight legs, the four anterior with suckers, and the four posterior with bristles, at their extremities. These burrows are best found between the fingers or on the penis. The diagnosis is made chiefly from the multiform character and seat of the eruption, and is certain when the burrows can be found.

PEDICULOSIS

is of three kinds:

1. **Pediculi Capitis** occur on the scalp of unwashed children. They cause intense itching, and the consequent scratching produces a pustular eruption, the exudation from which mats together the hair into a glutinous mass. The animals themselves are occasionally seen, but their ova are always conspicuous; they are attached to the hair, and may be distinguished from scurf by their adhering to the hair at the side, while a pellicle of scurf is perforated by the hair. Enlarged glands are frequently caused by the irritation of these parasites. They are most common on the occipital region.

2. **Pediculi Corporis** are diagnosed from the presence of scattered lesions, produced by scratching of parts of the body easily reached, as on the shoulders and neck. In the folds of the clothing the insect and its ova will be found. It is larger than the *Pediculus capitis*, and its body is longer and distinctly segmented.

3. **Pediculi Pubis** haunt the pubic region; they reside chiefly in the hair follicles of the skin. The irritation and scratching produce hæmorrhagic lesions, etc.; these may be seen beneath the skin—small blackish points, which consist of the animal and its excretions. The ova are attached to the pubic hair. This pediculus is broader and flatter than the others. The diagnosis is, as a rule, easy.

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THE END.

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